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Science and Coca-Cola

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Science and Coke? You must be joking. What logical set could possibly include as members the epitome of knowledge and the epitome of soft drink? Here is that set: each is a commodity, a commercial product bought and sold in a competitive market, and dependent for sales upon advertising. Ads for science? With no Pepsi to challenge for market-share, why does science need to be advertised? And how could science—if we distinguish it from technological applications—be considered commercial? Who are buyers and sellers of science? And without anticipation of profits that drive the manufacture of Coca-Cola, what drives the manufacture of science?

This paper has a simple theme, with anything-but-simple implications for a social theory of the “rise of science.” The manufacture of Coke and of science depend on the availability of money: liquid assets of the Coca-Cola Corporation are about \$1.2 billion; scientists preparing to do research with a new accelerator under construction near Geneva by CERN will have assets of about \$200 million for their initial round of experiments. To get this money, Coca-Cola sells beverage-products and scientists sell knowledge-products: last year, thirsty people bought \$9.3 billion of Coke world-wide and the United States government bought about \$60 billion of scientific research and development. Sales of all soft drink products went up 40% from 1976 to 1986, but American scientists did even better: a 176% increase in federal funding for R&D over the last decade. The Coca-Cola Corporation annually spends over \$180 million for advertisements to convince people to buy Coke; scientists themselves spend almost nothing on advertising but “science-ads” still appear everywhere to convince people (states or corporations or venture capitalists) to buy science. If Coke-ads succeed in eliciting sales, the Coca-Cola Corporation stays in business; if science-ads succeed in eliciting sales, scientists stay in business.

Advertising campaigns for science and Coke have much in common, as my illustrations will suggest: science-ads and Coke-ads define unique features of the two products, show how they are better than the competition, describe the variety of Coke-products and science-products for different needs and for different market-segments, and lure consumers with the promise of tantalizing side benefits.

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But one difference is crucial: science-ads—through various “de-advertising mechanisms” identified below—create science as something *other than* a commodity commercially bought and sold in a competitive market, and as something not in need of advertising. Paradoxically, science-ads tell audiences that “this is not a science-ad” because science is simply *not* like Coke at all and does not need to advertise. Scientists thrive (materially) because science is seen as a kind of public good rather than as a product whose sales “profit” its manufacturers, even though the perceived non-commercial character of science is accomplished in part with the same vehicle used to sell Coke or any other commercial good: advertising.

My curiosity about self-denying science-ads has been piqued by developments in four corners of the sociology of science. From Paris, Latour describes how Pasteur pioneered Madison Avenue techniques by convincing French officials that *their* wants were best satisfied through the purchase of *his* laboratory.¹ Just as Coke carried the day in 1952 with an advertising slogan that translated our interests into their product (“What you want is a Coke”), Pasteur told French society “What you want is science.” Coke-ads enlist Coke-drinkers as allies who satisfy their thirst while bringing needed revenue to the Corporation; science-ads enlist science-buyers as allies who satisfy their thirst for knowledge while bringing needed revenue to scientists. From York, Mulkay and friends describe the interpretative flexibility found in scientists’ diverse accounts of science,² the same discursive flexibility that may be the essence of successful advertising. No ad can be “definitive,” and characteristics of products are selectively revealed or hidden: a Coke-ad from 1942 that featured the slogan “Coca-Cola has that extra something” did not tell readers that the “something” might be sufficient acidity to dissolve a tooth.

From the Science Studies Unit at Edinburgh, the work of Barry Barnes, Donald MacKenzie and Steven Shapin suggests that although scientists may have divergent political or ideological interests that separate them, they are united by a common interest in maximizing collective or “professional” resources and opportunities made available (in unequal amounts) to practitioners.³ Just as Coke and Pepsi share an interest in government laws protecting their trade-marks, American scientists have a common stake in lobbying to enlarge the total budget of the National Science Foundation (though disputes about how that pie is cut into disciplines can be every bit as nasty as the cola

wars). From the Tremont Institute in San Francisco, a cluster including Elihu Gerson, Leigh Star, Adele Clarke, and Joan Fujimura pursue Chicago-school sociology of science by drawing attention to the idea that the “social world” of science goes far beyond laboratory walls.⁴ The “science-world” must include not only Einstein’s theories but a recent ad for Discovery Toys showing young Albert and his mother at play, with a message that if you buy your kids the right toys they too might grow up to discover relativity. Science goes on in odd places like consumer-product ads in *Time* or *Newsweek*, though these science-ads at the same time remind us that science really has no business amidst such crass commercialism.

Functions of Advertising

What do ads do? Much can be learned from Michael Schudson’s *Advertising: The Uneasy Persuasion*, although its focus on national consumer goods advertising would seem to tell us more about Coke-ads than Science-ads. The social significance of commercial advertising is not to persuade a rather inattentive audience to buy a *specific* brand but to instill in us a “consumer culture” or a “framework for thought and feeling” that “extols acquisition and consumption at the expense of other values.”⁵ The barrage of ads create an interpretative context in which the endless and even unnecessary purchase of goods has *prima facie* legitimacy: one does not have to justify “shopping.”

But this is the distanced view of a sociologist; advertising firms and their clients must believe (even if they cannot prove) that advertisements help to sell the specifically-mentioned product. That belief has led some advertisers to use “science” as a way to persuade consumers to prefer *their* brand. The claim “Scientists at a leading research university have discovered . . .” is an advertising cliché constantly testing our credibility. Why is it so common? An insightful discussion of science in consumer products advertisements comes not from the mountain of advertising textbooks but from a countertext designed to reveal the deceptive ploys that have become Madison Avenue stock-in-trade. The book is written by Hugh Rank and titled *How to Analyze Ads: The Pitch: A Simple 1-2-3-4-5 Way to Understand the Basic Pattern of Persuasion in Advertising*. The following, long passage from Rank, which explains *why* advertisers use white lab coats and fancy statistics to sell products, is best read while remembering the different image of science that has emerged from our sociological studies of what goes on in laboratory life:

‘Science’ is used here as a category of some human need or desire, a ‘good thing’ already wanted or desired by people; ads often simply associate their product or service with ‘science’ words or images, thus suggesting or implying an ‘added value’ to the buyer. . . . the common human desire for certitude (for support, reassurance, guidance, direction, approval) is related to this category of ‘science.’

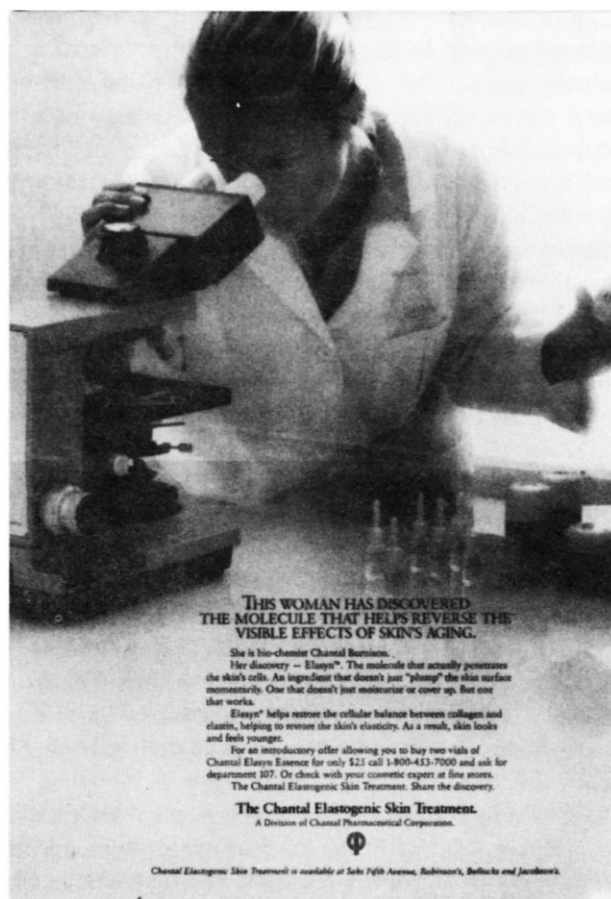
In a modern society, some say that science has replaced religion in the sense that some people have an almost worshipful attitude toward scientific authority and technological progress which seems to promise cures, solutions and a better life. Associating things with science and technology can also create the sense (or the illusion) of accuracy, certitude and truth. Non-verbal images suggesting scientific authority are very common (labs, microscopes, white-coated doctors, complex machinery, computers, print-outs, synthesizer music, etc.) as is the use of jargon and shop talk from many scientific and technical areas . . . There is widespread use of science to lend prestige to many products and services.

SCARE AND SELL: ‘attack words’ intensify the opposite, undesirable aspects: the lack of scientific values; superstition, ignorant, unskilled, illogical, unsubstantiated, inaccurate, etc.”⁶

The contrast between the science sociologists find in laboratory life (where “accuracy, certitude and truth” dissolve into political interests or contextually-contingent beliefs or empiricist repertoires) and the science taken-for-granted by advertisers and their audiences is sustained in part by science-ads themselves.

To return to Schudson, ads which present scientists as authoritative arbiters of useful truth reproduce another part of “culture”—not the consumer culture—but a kind of “folk epistemology” or a widely shared and simple theory of knowledge that demarcates scientific knowledge from other brands and (importantly) puts the purchase of science beyond reasonable question. Science-ads depict a science long ago banished from our sociology of it: science is assumed to be truthful, reliable knowledge, produced by disinterested experts, serving the good of us all. Such “misrepresentations” of science are characteristic of consumer product advertising, Schudson says, which “simplifies and typifies,” [and] “does not claim to picture reality as it is but reality as it should be . . .”⁷

But even the belief that science *should be* the fount of useful and truthful knowledge capable of reliable cures and solutions is sufficient to legitimate its purchase. Who would protest an investment in scientific research that discovers “the molecule that helps reverse visible effects of skin’s aging, as the bio-chemist Chantal Burnison claims for her Elastogenic Skin Treatment? That science-ad is not only selling “Elasyn” but the research from Burnison’s laboratory that confirmed “an ingredient that doesn’t just ‘plump’ the skin surface momentarily . . . but one that works.” In a word: science-ads reproduce a cultural environment in which purchases of science from scientists, not immediately by you and me but by our fiduciaries in industry and government, are made plausible, justifiable, legitimate, obvious. Few voters and fewer politicians argue these days that government should buy no science at all, although controversy continues over *which* science we



CHANTAL (1986)

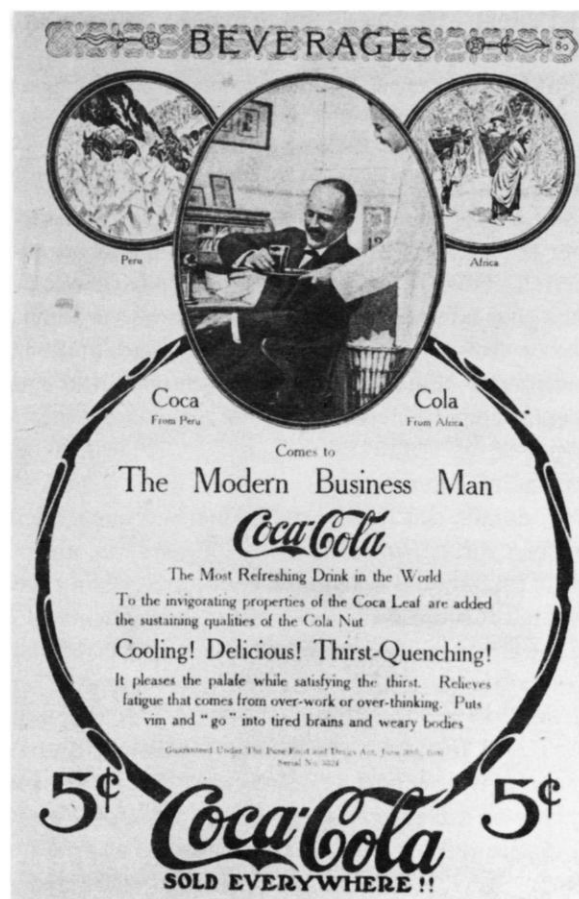
want to buy: Star Wars or a cure for AIDS.

How do science-ads market science? The question is not that different from asking how Coke-ads market Coca-Cola.

Coke-ads and Science-ads

Here are some pictures of advertisements for Coca-Cola and for a variety of other goods and services; the originals appeared in mass market magazines and newspapers. My analysis of them is not systematic: I am interested in the pitch that they make for a product, and (in a subset) how "science" is made part of that pitch. Because space allows me to reproduce only a few ads, I have selected polysemic ones (i.e., those rich enough to allow me to make several sociological points). The ads were originally scattered throughout the last eighty years, but I have little to say about historical changes in the form and content of advertising or in their changing use of science. And I am not looking to reveal deep symbolism or hidden meanings or subliminal persuaders: what interests me is on the surface, the intended and obvious messages about Coke and about science.

The complete Coke-ad tells readers *what* Coca-Cola is, *who* it is for, *where* we can get it, *when* we should have it,



THE BUSINESSMAN (1907)

why we need it, and why *only* Coke will do; a good example is "The Businessman."⁸ The heading at the top, and pictures of bottles and drinking glasses, leave little doubt that Coca-Cola is a beverage-product. But what makes this drink different from all other drinks? Only Coke contains a unique combination of coca leaf and cola nut that not only quenches thirst but wakes up brain and body. A weary businessman should take a Coke to invigorate and sustain himself for the next round of work. All this for only five cents, at drugstores everywhere (we infer this from the soda jerk serving up the drink). The tiny print above the logo reads "Guaranteed under the Pure Food and Drug Act, June 30th, 1906, Serial No. 3321," presumably an assurance that Coca-Cola safely delivers its promised "vim and go" as no other soda can.

But Coca-Cola is not only for busy businessmen. "The Arrow" expands the target audience to include "everybody, everywhere," in "every walk of life." The *universal* love of Coke is a theme that persists through the 1970s jingle "I'd like to teach the world to sing/In perfect harmony/I'd like to buy the world a Coke/And keep it company." No one, nowhere is excluded from Coke. "The Arrow" also confronts the problem of distinguishing the original Coca-Cola from a myriad of like-sounding impostors: "Be sure to get the genuine. Ask for it by its full name to avoid imita-



THE ARROW (1907)

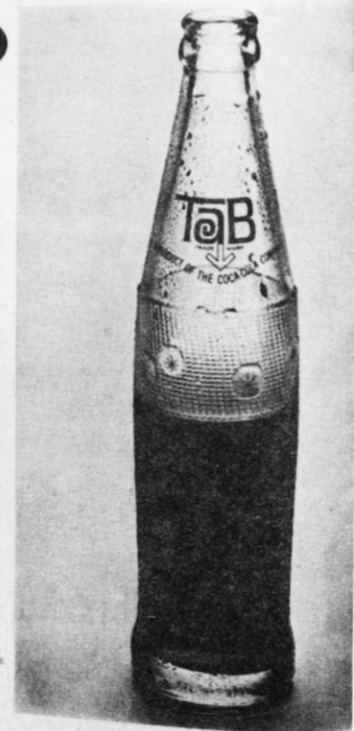
tions and substitution." For many of us, it is *only* the name that distinguishes Coke from Pepsi (although cola addicts swear the two are like night and day), and that is one reason why Coke resisted for a long time the proliferation of products bearing its brand name. At risk of confusing consumers about what really *is* the real thing, we now have New Coke, Coca-Cola Classic, Cherry Coke, Diet Coke, Caffeine-Free Coke . . . The simplicity of one product for all people had obvious marketing appeal, especially for something sold in innumerable countries and languages. The diet craze forced Coke to produce a cola drink that was targeted only for *some* people: the thinning crowd. But "Tab" covers all bases by selling it as "just one calorie" to the slimming Mrs. Jackie Olmstead and by selling it as just "good taste" to her naturally slim children. This effort at market segmentation—simultaneously denied by reminding consumers that anyone can enjoy any Coke product—is continued in the current jingle "Just for the taste of it . . . Diet Coke."

So *when* should we reach for a Coke? "Cuba" tells us: "the moment of fun." The ad illustrates a long-running pitch linking Coke to the good times and the right people; the product has subtly evolved from something we need to something less utilitarian but still desirable. Compare "Cuba" from the 1950s to "The Bridge Player" from the

How can just 1 calorie taste so good?



Mrs. Jackie Olmstead likes Tab to help keep herself and her husband trimmer. Trimmer. Looking more in shape than ever. Her children just like Tab, period. (They couldn't care less about calories. All they care about is taste.) The Olmsteads aren't alone, either. Lots of people are changing everywhere. Living trimmer, more active lives. And Tab is a part of it. How can just 1 calorie taste so good? Easy. The Coca-Cola Company kept the flavor in Tab.



TAB (1965)

1930s. In "Cuba," we associate Coca-Cola with pleasant moments lying around on the beach, and with the lucky people who can afford such leisure (if Coke is also for the poor—as claimed in "The Arrow"—we never see them in their ads). Water might do for that dull everyday thirst, but the fun thirst you get with your tan is made for Coke. In "The Bridge Player," Coke is something without which we are not "normal." Its restorative power is *needed* to prevent that fatal gaffe: yawning when you are supposed to be having too good a time to be tired or (worse) bored. So: we need Coke to stay awake, but we should want it even when we do not need it: are those beachcombers in "Tab" and "Cuba" trying to stay alert? Coke can be an upper or a downer, it seems, and since those are the only two ways to go, it is right *anytime*.

"The Bridge Player" begins our move from Coke-ads to science-ads. If you do not believe Coke's claims for its products, then take it on the authority of "foremost scientists" who say that it *really* works "in restoring you to your normal self." The epitome of a Coke-and-science-ad is "The Testimonies." Unfortunately, I do not know where this "text" was first published (the tearsheet I examined had no identifying reference); it is not *obviously* an ad for anything. So let me invent a scenario that may be like the one in 1905 that produced this text. The setting, say, is the office of a



CUBA (1958)

Methodist publishing house in Atlanta; present are the magazine editor and a company official from Coca-Cola.

EDITOR: We've got a problem. I don't think we'll be able to run any more of your ads in our magazine. Some of our subscribers have been, well, talking about what might be in Coca-Cola. You know how we Methodists are about alcohol and those sorts of things. A few believe that there might be cocaine or some other drug...

COKE: Now wait just a minute. Don't tell me that you *believe* that rumor?

EDITOR: Well, your ads do mention coca leaves, and anyway—how are we supposed to know what is or isn't in the stuff?

COKE: Take my word for it: there's no cocaine in Coca-Cola. I swear.

EDITOR: That won't work. Nobody would believe you or anyone else at your Company.

COKE: Why not? We know what goes into the syrup, and I'm telling you there is nothing in it that a Methodist could not drink.

EDITOR: Now don't get upset. I'm not accusing you of anything. I mean, really: the magazine badly needs



THE BRIDGE PLAYER (1933)

your ads. You pay for about half our costs for each issue. But you guys are also in business, and there are too many Doubting Thomases in our Church who think you'd tell us anything so long as we kept drinking Coca-Cola.

COKE: I have a plan. If you guys won't take my word for it, let's find someone who you *can* trust.

EDITOR: Any ideas?

COKE: I just happen to have these two letters with me, one is from the State Chemist and the other from a scientist up in New York who manufactures cocaine and other alkaloids.

EDITOR: What's an alkaloid?

COKE: Don't ask me. Seems they have done some experiments on Coca-Cola and found no traces of cocaine or any other illicit substances. Maybe you could run these letters as testimonials to our purity.

EDITOR: Scientists? Do they believe in the Bible or that evolution hogwash? Besides, why should I trust them? You might be in cahoots with these guys.

COKE: This guy is a *chemist*; he has no financial stake in the outcome. He gets paid by the State. He is supposed to protect us, right? Are you accusing me of bribing a public official? Look, it says he bought our syrup

AS is customary with the advent of any article into the advertising columns of the religious press, we have subjected the popular temperance beverage, "Coca-Cola," to a most thorough and impartial chemical analysis, in order to assure our readers that the advertising, as well as the reading columns of this publication, carry matter of a kind worthy of their consideration.

As to its fascinating qualities, perhaps this is best illustrated by the fact that two words are and always have been so constantly used in its praise as to have become almost of national description—the words "delicious" and "refreshing."

In the matter of its chemical properties and their effects upon health, the declarations of eminent chemists better express the matter than could be done by a layman:

**STATE OF GEORGIA, Department of Agriculture,
Division of Chemistry.**

The Coca-Cola Co.,
Atlanta, Ga.
Atlanta, February 6, 1905.

Gentlemen: Referring to your recent inquiry as to a copy of any analysis I may have made of Coca-Cola, I beg to furnish you with the following copy of a letter written to Professor Kilgore, State Chemist of North Carolina, who inquired particularly concerning any analysis of Coca-Cola which I might have made:

"In the matter of Coca-Cola, there was a bill introduced at the last Legislature imposing a tax upon all the soda water syrups, and I believe it was amended to put a still higher tax upon Coca-Cola than upon other syrups, because of its supposed injurious character. I analyzed a sample of Coca-Cola, which I bought in the open market, and tested carefully for cocaine, and also for morphine, neither of which were present. I found 1.37 grains of caffeine per fluid ounce of the Coca-Cola syrup, and calculated that this amount was considerably less than would be found in a cup of coffee, according to the analysis given in Allen's Commercial Organic Analysis. I also found that Coca-Cola contained .2472 grains of Phosphoric Acid. I did not undertake to estimate or determine any of the various flavoring ingredients which are used in Coca-Cola. My final judgment about the matter was that there was nothing more injurious in Coca-Cola than would be found in tea and coffee. I have seen no other analyses which have been made of this syrup. The specific gravity of the sample which I examined was about 1.28. Practically all of the solid matter shown by this specific gravity was due to sugar.

Very truly yours,
"JOHN M. McCANDLESS, State Chemist."

Quite as conclusive as the reports of State Commissions is that of Dr. Louis Schaeffer, President of the Schaeffer Alkaloid Works, Maywood, N. J., large manufacturers of Cocaine, Caffeine, Strychnine and other alkaloids. At the request of the Coca-Cola Company, this gentleman bought a sample of Coca-Cola liquid in the open market, for the purpose of analyzing the same to ascertain whether the syrup contained cocaine or other alkaloids. His report is as follows:

"On March 7th, 1904, I went to the drug store of J. Milhaus' Son, 183 Broad way, New York, N. Y., and ordered a pint of original Coca-Cola syrup. I obtained a bottle which, the druggist asserted, was taken from the original stock. I made, during the 5th, 6th and 10th of March, a thorough analysis of the obtained syrup, using the best knowledge of my long experience in the chemistry of alkaloids, to isolate the alkaloids of the sample. I found that the sample contained a small percentage of Caffeine, which is the Alkaloid of Cola Nut, and which also exists in large quantities in tea leaves and Coffee Beans. Outside of Caffeine, I could not isolate any other alkaloids. I especially directed my efforts to the detection of Cocaine. For this purpose I made repeated fractional examinations of the Total Alkaloid obtained from the syrup. I narrowed the fraction which should contain all the Cocaine of the sample, if there were any present, repeatedly down, to find in each case that not a trace of Cocaine, which has very pronounced characteristics, could be detected.

"The above experiments prove to me conclusively that the Coca-Cola Syrup, as sold by the Coca-Cola Company, does not contain a trace of Cocaine."

(Signed) DR. L. SCHAEFFER

"Acknowledged before me this eleventh day of March, 1904. Albert Frankel, Notary Public, No. 68, Kings Co., N. Y."

THE TESTIMONIES (1905?)

on the open market. We didn't slip him anything special. This is all above board.

EDITOR: How do I know he really did any experimenting on the syrup?

COKE: Where else do you think he got these numbers like 1.37 grains of this and .2472 grains of that. You don't get that kind of accuracy unless you're doing real scientific research.

EDITOR: Maybe these chemists wouldn't know cocaine if it bit them on the nose.

COKE: Well, look at this other letter. The man has long experience in the chemistry of alkaloids. I mean, he is an expert. And he says that the cocaine would have "pronounced characteristics." He couldn't miss it. Besides, he *repeated* those fractional whatevers and kept finding the same nothing. I tell you, there really is nothing funny in Coca-Cola. And he even went to the trouble to get the letter notarized.

EDITOR: If this scientist is so trustworthy, why do I need the assurance of a notary public?

COKE: Be reasonable. We've got two testimonials from two experts who have never met. Isn't that enough to make you confident that they've got it right?

EDITOR: OK, let's print them both and see what happens. Cup of coffee for you?

SCIENCE
DISCOVERED IT —
YOU CAN PROVE IT

"No Unpleasant After-taste"

— added to the world's most famous ABCs —

**Always Milder
Better Tasting
Cooler Smoking**

Here's the Biggest 'Plus' in Cigarette History!

"CHESTERFIELD IS THE ONLY CIGARETTE of all brands tested in which members of our taste panel found no unpleasant after-taste."

From the report of a well-known research organization

Always Buy CHESTERFIELD



CHESTERFIELD (1951)

This scenario (in compact form) is rehearsed when any ad-writer and client decide to involve "science" in an advertisement. The sociological beauty of "The Testimonies" is that, unlike later ads that typically rely on synecdoche (as in "Chesterfield," where microscope and white coat hint at science *tout court*), the case for trusting scientists is *elaborate*. Readers are told that scientists are disinterested, that they have no material stake in the outcome. The titles "Professor" and "Doctor" establish credentials and, presumably, certify their training. The experiments measure nature, converting "sweet" into a specific gravity of 1.28 due to sugar. That precision, and the use of technical terms like "alkaloid," establish scientific knowledge as more than common sense. It is the kind of knowledge only specialized experts can provide: years of experience in alkaloid chemistry were needed. Conclusions in science are based on independent but reproducible results of experiments with nature.

This is all spelled out in "The Testimonies"; but these same assumptions form a widely-shared folk epistemology evoked by the mere whisper of "science." No better evidence can be found than "Chesterfield," in which the jumbled images and assertions create a parody of the science-ad. The "science" is presumably the testing done with a "taste panel" as reported by a "well-known research

Of cigarettes and science.

This is the way science is supposed to work.

A scientist observes a certain set of facts. To explain these facts, the scientist comes up with a theory.

Then, to check the validity of the theory, the scientist performs an experiment. If the experiment yields positive results, and is duplicated by other scientists, then the theory is supported. If the experiment produces negative results, the theory is re-examined, modified or discarded.

But, to a scientist, both positive and negative results should be important. Because both produce valuable learning.

Now let's talk about cigarettes.

You probably know about research that links smoking to certain diseases. Coronary heart disease is one of them.

Much of this evidence consists of studies that show a statistical association between smoking and the disease.

But statistics themselves cannot explain why smoking and heart disease are associated. Thus, scientists have developed a theory: that heart disease is caused by smoking. Then they performed various experiments to check this theory.

We would like to tell you about one of the most important of these experiments.

A little-known study

It was called the Multiple Risk Factor Intervention Trial (MR FIT).

In the words of the *Wall Street Journal*, it was "one of the largest medical experiments ever attempted." Funded by the Federal government, it cost \$315,000,000 and took 10 years, ending in 1982.

The subjects were over 12,000 men who were thought to have a high risk of heart disease because of three risk factors

that are statistically associated with this disease: smoking, high blood pressure and high cholesterol levels.

Half of the men received no special medical intervention. The other half received medical treatment that consistently reduced all three risk factors, compared with the first group.

It was assumed that the group with lower risk factors would, over time, suffer significantly fewer deaths from heart disease than the higher risk factor group.

But that is not the way it turned out. After 10 years, there was no statistically significant difference between the two groups in the number of heart disease deaths.

The theory persists

We at R.J. Reynolds do not claim this study proves that smoking doesn't cause heart disease. But we do wish to make a point.

Despite the results of MR FIT and other experiments like it, many scientists have not abandoned or modified their original theory, or re-examined its assumptions.

They continue to believe these factors cause heart disease. But it is important to label their belief accurately. It is an opinion. A judgment. But not scientific fact.

We believe in science. That is why we continue to provide funding for independent research into smoking and health.

But we do not believe there should be one set of scientific principles for the whole world, and a different set for experiments involving cigarettes. Science is science. Proof is proof. That is why the controversy over smoking and health remains an open one.

R.J. Reynolds Tobacco Company

R. J. REYNOLDS (1985)

organization." But how does one use a microscope to detect taste? And if ash from that cigarette were to fall on the slide, it would look like a dinosaur! No matter. Take it from science: Chesterfield really does taste better.

"R.J. Reynolds" does a more effective job in reminding us of what we all know about science. It carefully reviews the logic of scientific method, and may well do a better job of selling science than cigarettes. Here we read an explication of why scientific knowledge is more reliable than non-scientific brands: the credibility of its conclusions can be traced back to the unique methods of its production. The ad suggests that "scientists" who violate these methods by retaining a theory in the face of non-corroborative findings (or by converting bivariate correlation into causation) have left science for the realm of "opinion." Science is factual "proof," not "judgment" (as we are reminded in the current General Motors slogan "Science not Fiction"). Notice how the ad deftly avoids the problem of maintaining scientific credibility when scientists offer different truth: those other scientists who tell you that smoking causes coronary heart disease are simply not being scientific—they violate *the method*.


Science enters consumer-product advertisements not only to establish credibility of claims, but to establish novelty and utility of technological miracles. Science is tied to

Important Milestones in Modern Medicine: 1780—Triumph Over Contagious Diseases. First inoculation by Dr. Jenner.
1844—Triumph Over Pain. Dr. Morton's demonstration of ether. 1928—Triumph Over Bacterial Infections. Fleming discovers penicillin.
Now—1956—Procter & Gamble proudly announces . . .

TRIUMPH OVER TOOTH DECAY

Crest Toothpaste with Fluoristan **strengthens teeth themselves.**
You brush Crest on... it actually goes in... and locks decay out

Fluoristan® is Procter & Gamble's exclusive element fluoride formula — gives the greatest decay protection in any toothpaste.



Miracle of the Tooth Without Teeth. For years, children growing up in certain States were more likely to have lost teeth. Then science learned what nature's decay prevents. *Fluoride*, was present in their drinking water!

Science Long Tried to Capture Fluoride—only recently approved possession of fluorine in a toothpaste. In fact, after years of research, university scientists discovered Fluoristan—the greatest decay protection in any toothpaste.


Fluoristan Makes Possible Crest. Without Fluoristan, you cannot get maximum protection against tooth decay with a toothpaste. You brush Crest on . . . it actually goes in . . . and locks decay out, for adults and for children, 6 and over.

Dentists Tested Crest for over 10 years with 5,873 people. No toothpaste is as decay-free as Crest. Crest on decay-prone mouths never approached by any 10 toothpastes. Then Crest made a new . . . through our tooth decay experts.

IMPORTANT

Crest with Fluoristan is the only toothpaste ever developed that makes possible a major reduction in tooth decay for everyone, everywhere, by strengthening tooth enamel. In this way, Crest actually fortifies and strengthens teeth to lock out cavities—the only toothpaste proved to do so. With Crest, your family approaches the long dreamed-of day of healthy, decay-free teeth.

You brush Crest on . . . it actually goes in . . . and locks decay out. Each time you brush Crest on your teeth, Fluoristan builds new resistance to decay into tooth enamel. In this way, Crest actually fortifies and strengthens teeth to lock out cavities—the only toothpaste proved to do so. With Crest, your family approaches the long dreamed-of day of healthy, decay-free teeth.



NO OTHER TOOTH PASTE PREVENTS DECAY LIKE CREST!

CREST (1956)

the future, to a better world, to progress, to new solutions of old human ills. "Crest" links its "Fluoristan" to the history of scientific medicine's triumph over disease: Jenner's inoculation to Fleming's penicillin to Crest's toothpaste. Science did what common-sense could not: those happy Western parents with cavity-free kids had no idea why they were so lucky. Scientists converted common sense into a discovery and then into a uniquely effective new technology that marks a "turning point in man's age-old struggle against this almost universal disease." Crest is obviously trying to sell toothpaste, but Procter and Gamble's ad effectively promotes science as a "public good" benefiting us all. Who could deny the desirability of "the long-dreamed of day of healthy decay-free teeth?" As advertisements for Dupont used to say: "Better living through chemistry."

In "Champion," science again becomes an unassailable public good and a fount of the better world: genetic engineering, for example, will be "a boon to children with stunted growth." But what is being sold here? It is almost incidental that gene splicing will allow Champion to grow a more profitable tree. In 1980 as now, genetic engineering invites discussion of government regulation to protect escape of dangerous new beasts and to allow public control over morally questionable creations. Such government

The future is coming. And with it will come great benefits for mankind. And a whole new set of problems. Because we are a forest products company, and plant seeds that take up to 50 years to become mature trees, Champion International has to think a lot about the future. We'd like to share some of the things we've learned with you—to help you make intelligent choices in the years to come. Here is something you might want to think about.

In the future, a new science called gene splicing could produce miracles—like the regeneration of limbs, a cure for cancer, even the flowering of a “better” human being.

But who is going to decide what makes a “better” human being?

Some years ago, a child was checked into a hospital; the tip of one finger had been sliced away. The wound was dressed, but the patient neglected. Days later, the dressing was removed. The finger tip was growing back.

At the time, regeneration was a baffling and spooky phenomenon.

Today, we are beginning to learn more about it through the science of genetic engineering. Genetic engineering has the potential to alter the make-up of mankind as no other science ever has or possibly ever will. Gene splicing, one aspect of this new science, is the transfer of genetic material from one living thing to another. With this technique, a gene can be isolated and, when planted in a bacterium, start a whole new process of organic reproduction.

The realizable benefits of genetic engineering are both stunning and myriad.

Splice a gene that produces human insulin into a replicating microorganism, and diabetics have ready access to a purer, yet less expensive insulin. Researchers have already synthesized the hormone responsible for human growth, an immediate boon to children with stunted growth. It's increasingly likely that gene splicing will be able to mass-produce interferon, the anti-viral wonder drug that may put the brakes on flu, hepatitis, and certain kinds of cancer.

Eventually, bacteria may become assembly lines for the creation of whole new life forms, including “better” human beings.

In the long reach after his own betterment, man has covered incalculable ground: from primitive man domesticating wild wheat to his use, to modern man on the threshold of making a better organic self out of his existing self.

The promise for our future is almost beyond comprehension.

Which means questions have to be asked (and answered) right now.

Most critical: who is qualified to decide what makes a “better” human being? Who among us has the capacity, much less the right, to choose?

Also: what safeguards will there be against bacteria containing poisoned genes escaping from the laboratory and contaminating the very life we're trying to improve? Can patents be awarded to private industry for what is essentially life itself? If so, can science retain its necessary purity and freedom in a commercial situation?

These are questions that desperately concern us all because we are the subject matter.


If you're concerned with the immediate future, and would like a bibliography for further reading, send for our free brochure: Champion International Corporation Dept. 200T, P.O. Box 10142 Stamford, Connecticut 06921

Write us today. The future is tomorrow.

Champion—
a forest products company with its roots planted firmly in the future.

We are in the forest products business. We plant trees, grow trees, harvest trees. And from trees we make wood building products. Plus line paper for printing and business. And paper packaging for shipping and selling.

Because we make our living from the forest, our success depends, in one way or another, on the future. And we're planning—and planting—for it.




Champion
Champion International Corporation
Planting seeds for the future

CHAMPION (1980)

regulation could impede Champion's quest for the most profitable tree, so in effect, the ad is trying to sell us on the *idea* of unbridled genetic engineering, and that case is more easily made by talking about cures for hepatitis, flu and cancer (public good) than by talking about profitable trees (private gain). Obviously, scientists engaged in genetic engineering (both in private and public sectors) can only champion Champion's efforts: they, too, “profit.” But the ad cautions—in its litany of troubling questions raised by genetic engineering—that science will continue to move us into the better world only if it can “retain its necessary purity and freedom in a commercial situation.” The miracles of science are polluted by the world of money.

De-Advertising Science

Science-ads present a paradoxical problem for advertisers who use science to sell consumer products, and potentially an even greater problem for scientists. As Rank observed, science sells Coke or skin care products because we assume its findings are reliably truthful and because we suspect that they emanate from disinterested and objective experts working in value- and interest-free research contexts shielded from compromising pressures found in commercial or ideological marketplaces. This is the pitch for science—but in order to work for advertisers of con-




**HIS NECK
Might Save
YOUR
HEART**

High blood pressure can cause stroke and contribute to heart attack. The giraffe, with sky-high pressure pushing blood up 10 feet of neck, escapes these threats. Research scientists have been searching for years. Their findings might help guard you against high blood pressure damage.

Nearly 100 million Heart Fund dollars have been spent since 19 on many vital research studies. Thousands of lives have been saved as a result, but the cardiovascular diseases remain your Number 1 health enemy. Scientists need more dollars now to expand their search. Be them to help you.

**Give... so more will live
HEART FUND**



GIRAFFE (1965)

sumer goods, it cannot be read as a pitch. No matter how hard Coke tries to assure us of its purity or its effectiveness, few consumers fail to recognize such claims as ploys to sell a product made by a manufacturer whose coffers expand if we believe them. We recognize Coke as a commodity being sold to us. Science too is a commodity, but sales of scientists' products depend in part on them not being recognized as commodities. Science *could* become perceived as a commodity if science-ads are seen and read as Coke-ads: “buy this knowledge so that scientists can stay in the research business.” Compensating mechanisms are needed to preclude the idea that science is just another business.

I call these compensations “de-advertising mechanisms,” and both scientists and advertisers who use science have a stake in their effectiveness. Advertisers can continue to use science as a ploy to assure consumers of the truth of their claims only if the folk epistemology defining science as the epitome of reliably truthful accounts of nature remains more or less intact. Scientists benefit in two ways: if science is perceived as reliably truthful knowledge, its purchase by public fiduciaries (i.e., the state) is taken-for-granted as legitimate because it is seen as a common public good rather than as a commodity whose purchase benefits sectarian interests (of scientists, for

example). Also, if advertisers continue to use science in their ads, scientists benefit from the broadcasted reproduction of this folk epistemology without paying for it. The danger is for science to become too much like Coke: as something we buy that directly benefits producers or purveyors whose interest in maximizing sales could jeopardize the accuracy of proffered descriptions of nature.

The paradox: Scientists rely on science-ads to reproduce a folk epistemology that defines their accomplishments as the epitome of reliably truthful and useful knowledge, and that presents an unquestionable *prima facie* case for their purchase. But if science-ads are seen merely as ads their message is lost: can we believe claims to reliability and accuracy (or even utility) if scientists are—like Coke—dependent on sales driven by these advertisements?

De-advertising mechanisms allow science-ads to sell science without our recognition that this is what is happening, and here are some examples. Science-ads tell us why we should want more science, but they do not tell us what we need to know in order to *buy* some of it. In effect, science-ads break almost every rule in advertising textbooks, in that they fail to identify the product in an easily recognizable way, to tell us the point-of-sale and the price, and to make us see ourselves as realistic buyers. In the early ads for Coke (before everyone came to know everything about it), readers were told that *you* should buy this bubbly beverage for only five cents at the corner soda fountain. All the information is there to achieve the advertisements' goal: to convert a magazine reader into a Coke-buyer. By contrast, science-buyers are left in the dark. The easily-grasped bottle of Coke becomes the enigmatic "knowledge" or "trust" or "expertise"; dollars and cents are rarely mentioned; we are never told where science is bought and sold. Readers of science-ads cannot see themselves as buyers of science from scientists, even though they *are* buyers of science when they purchase consumer goods produced (or marketed) with the aid of scientists or when they pay taxes to finance federal "patronage" of research.

All of the clues to seeing science as involved in commercial transactions are missing, *not* because it is not bought and sold like Coke but because its sales depend on its not being *seen* like Coke. This might explain why, in "Crest," the discoverers of inoculation, ether, and penicillin are mentioned by name but Harry G. Day and his colleagues at Indiana University who discovered stannous fluoride become the generic white-coated scientist holding a test tube. (Proctor and Gamble did indeed support Day's research, and Indiana University has since benefitted materially from the sale of Crest toothpaste.) The authoritative disinterestedness of science is enhanced by its depersonalization: to mention Day by name raises questions about *his* financial relationship to the Corporation that profited so much from the discovery. That disinterestedness is enhanced again by the correct assumption that scientists are not the *sponsors* of science-ads: science becomes a free-

rider in a pitch to buy toothpaste or skin treatments. R. J. Reynolds bought that page in *Family Circle* magazine in order to sell its cigarettes. How could science be a commodity if ads for it are bought not by scientists (the indirect beneficiaries) but by those who are using science to sell cigarettes or forest products or Coke?⁹

There are exceptions of course, but some only prove the rule. The most explicit exhortation for ad-readers to buy science (that I have found) is not in a consumer-product ad but in a "public service message" for the Heart Fund (labeled "Giraffe").¹⁰ The ad explicitly recognizes that scientists need dollars, but the altruistic goal of this research disconnects the plea from a commercial context. Science is established as a public good available and benefitting us all, rather than a market exchange that enables scientists to stay employed. This idea is reinforced by the absence of advertisements for competitors of science urging consumers to prefer *their* brand of knowledge or expertise. The competitive and commercial nature of Coke is obvious in a Pepsi-Cola ad showing a 21st-century archaeologist digging up a Coke bottle that he cannot identify, as the camera pans to scenes of a future littered with the logo for Pepsi. I have not seen an ad extolling the virtues of "ignorance" (one alternative to science), and generally ads for scientists' competition come not from commercial products but from alternative belief systems (as in an ad for religion that recommends the Bible over evolution). The near-absence of ads for competitors sustains the image that science is unique (in a category of its own) and an undeniable *good* (only the irrational could prefer the alternative).

My restricted focus on science *in* consumer-product advertising must be relaxed if one further kind of de-advertising is to be identified. Advertisers call "marketing mix" the *variety* of ways producers get their products in front of consumers. Coke has not limited itself to print mass media: we have been subjected to video ads, billboards and other outdoor signs, promotional trays and toys and calendars, cents-off coupons, displays at the points of sale, visible sponsorship of artistic or sporting events and (now) trendy and expensive clothing with the irrepressible logo. Science, too, is marketed in a variety of ways that further obscure its identification as a commodity bought and sold (in part) for the financial support of scientists. Where do we *meet* science? I remember: childhood "field trips" to a natural history museum, "Mr. Wizard" on TV, my first chemistry set ("You, too, can turn water into wine!"), dusty shelves of *National Geographic*, an adolescent "science project" ill-titled *The Science of Plant-Growth* and the scientific dismemberment of a frog in biology class. Things have not changed much: my sons at ages six and seven know that paleontologists are those scientists lucky enough in their view to spend their lives studying dinosaurs (what could be less commercial?).

The point: none of the settings where we form our early and enduring images of science are businesslike. In choos-

ing to look at science-ads in magazines and newspapers, I have chosen perhaps the “toughest case,” for the link between science and business could easily be inferred here (as in the Rockwell International slogan “. . . where science gets down to business”), and *would* be inferred if not for de-advertising. Science-ads are not recognized as ads because all of our *other* contacts with science have little obvious commercial relevance. By the time we are able to read consumer-product advertisements that mention science, we bring to them assumptions about science that picture it as completely unlike Coca-Cola. This does not reduce the importance of science-ads in reproducing those long-ago learned assumptions that science *is* the epitome of reliably useful knowledge about the world. Schudson says that reproduction is the goal of most consumer product advertising, which talks to “the already converted” hoping “to affect people who are already committed to a general product category.”¹¹

De-advertising mechanisms preserve the distinctive selling-points of science: its status as a public good of universal aid, its promise of a new and better world resulting from useful and truthful discoveries about nature by disinterested expert specialists not concerned about the bottom line. The de-advertising mechanisms found in science-ads and elsewhere *demarcate* science from business, and minimize the skepticism readers bring to ads for Coca-Cola.

A Concluding Agenda

Such a paper as this can have no conclusion, for it is but a slim beginning to possibly fruitful lines of inquiry. The extended parallel of science and Coca-Cola is designed to provoke a reconceptualization of sociological theories about the historical “rise of science.” That should really be “rise of *scientists*,” for the central message is that the growth of scientific knowledge is dependent upon *scientists*’ acquisition of the material and symbolic resources needed to do research and to broadcast results. A “social theory of science” must be able to explain three centuries of improvements (with only an occasional slide) in these working conditions of scientists: the prestige of their occupation, the money they receive for services rendered (in the forms of wages, grants, facilities), their authority over questions of fact, and the autonomy to pursue their own curiosities. The comparison to Coke suggests a kind of explanation that is *not* effective: the spectacular financial success of the Coca-Cola Corporation cannot be explained by the immanent qualities of Coke (it really is a sweet fizzy liquid, but so is Pepsi) nor by the innate thirstiness of humans (let them drink water). So: the spectacular financial success of scientists cannot be explained by immanent qualities of the procedures or products of scientific research nor by an innate human “need to know.” Both Coke and science thrive because of their successful marketing: potential buyers must be told (repeatedly) how Coke and

science can distinctively satisfy their needs; indeed, the advertising even tells us what we *need*. No history of Coca-Cola is complete without several chapters on its advertising and marketing; that is also the case for a history of science. Claims by scientists to the Truth or Utility of their knowledge are not viewed (from this theoretical angle) as definitive descriptions of what science yields but as a pitch for its purchase, not unlike the 1947 slogan “The quality of Coca-Cola is a friendly quality you can always trust.”

We lack systematic studies of ubiquitous efforts by scientists and allies to sell their expertise and accomplishments in a competitive knowledge-market. Those studies would identify the occasions in which science is advertised (from primary school science-textbooks to appeals by scientists before Congressional committees reviewing budgets for the National Science Foundation), the contextually-contingent content of the “sales pitch,” the different characteristics of buyers at various “points of sale.” The research would focus on how scientists meet the competition: what arguments are used to convince potential buyers that extant knowledge is insufficient (“more research is needed”); that scientific knowledge is superior to non-scientific kinds marketed by other knowledge-producers such as religionists, ideologues, politicians, lawyers, soothsayers or you and me¹²; and that one kind of science is preferable to another (disciplines sometimes compete among themselves selling distinctive brands of scientific expertise and authority). All this should add up to a better understanding of folk epistemologies—diverse and often implicit assumptions about types of knowledge and their relations and utilities—that sustain a cultural context in which purchases of science only rarely face successful challenge. To better understand the culture that typically defines science as the epitome of reliably useful knowledge requires studies of how science gets done *outside* laboratories and journals—in advertisements for consumer-products, as one small example—though the findings there will tell us much about why and how laboratories and journals acquire the wherewithal to exist.

In 1986, both Coca-Cola in Atlanta and the Pasteur Institute in Paris celebrated their centennial as two of the most successful marketing campaigns in the history of . . . business? “Things go better with science!”

Notes

1. Bruno Latour, “Give me a Laboratory and I will Raise the World,” in *Science Observed*, Karin D. Knorr-Cetina and Michael Mulkay, eds. (London: Sage, 1983), 141-70.

2. For example, Michael Mulkay, *The Word and the World* (London: George Allen and Unwin, 1985) and G. Nigel Gilbert and Michael Mulkay, *Opening Pandora's Box: A Sociological Analysis of Scientists' Discourse* (Cambridge: Cambridge University Press, 1984).

3. Among the many works of the Edinburgh School are: Donald A. MacKenzie, *Statistics in Britain 1865-1930* (Edinburgh: Edinburgh University Press, 1981); Barry Barnes, *Interests and the Growth of Knowledge* (London: Routledge and Kegan Paul, 1977); Steven Shapin, “Homo Phrenologicus: Anthropological Perspectives on an Historical Problem,” in *Natural Order*, Barry Barnes and Steven Shapin, eds. (London: Sage, 1979), 41-71.

Notes continued on page 31.

a strong linkage between the outcomes of science policies and the development of the international scientific literature. The base for this linkage is not "authors" but articles, or to put it more technically: document sets. The crucial question becomes: what makes a scientific article a significant contribution? From this perspective, science policy issues inevitably assume a more cognitive aspect.

Notes and References

1. K. E. Studer, D. E. Chubin, *The Cancer Mission. Social Contexts of Biomedical Research* (Beverly Hills/ London: Sage, 1980), 269.
2. G. Küppers, P. Lundgreen, P. Weingart, "Umweltprogramm und Umweltforschung", in *Geplante Forschung*, ed. W. v.d. Daele, W. Krohn, P. Weingart (Frankfurt a.M.: Suhrkamp, 1979), 239-286. On funding, see S. E. Cozzens (ed), "Funding and Knowledge Growth", theme section of *Social Studies of Science*, 16 (1986), 9-150.
3. Cf. I. Spiegel-Rösing, *Wissenschaftsentwicklung und Wissenschaftssteuerung*, (Frankfurt a.M.: Athenäum Verlag, 1973), 106-131.
4. L. Leydesdorff, "The Development of Frames of Reference," *Scientometrics* 9 (1986), 103-125.
5. In most cases the variables load on a second factor only in the second decimal, and hence the split is almost complete. The factorial complexity of citing or being-cited patterns can in such cases be used as an indicator of the "interdisciplinarity" of a journal.
6. In the social sciences, there is more evidence that particularistic criteria may be influential even at this level. See also: W. C. Yoels, "The Structure of Scientific Fields and the Allocation of Editorships of Scientific Journals: Some Observations on the Politics of Knowledge," *The Sociological Quarterly* 15 (1974), 264.
7. L. Leydesdorff, "Various Methods for the Mapping of Science", *Scientometrics* 11 (1987) 291-320. See also Leydesdorff, "Frames," 122.
8. A. W. Gouldner, "Cosmopolitans and Locals: Toward an analysis of latent social roles," *Administrative Science Quarterly* 1 (1957), 281-306, and *Administrative Science Quarterly* 2 (1958), 444-480.
9. R. D. Whitley, *The Intellectual and Social Organization of the Sciences* (Oxford: Oxford University Press, 1984).
10. P. Groenewegen, "Attracting Audiences and the Emergence of Toxicology as a Practical Science," in *The Social Direction of the Public Sciences: Causes and Consequences of Co-operation between Scientists and Non-Scientific Groups*, *Sociology of the Sciences Yearbook*, vol. XI, eds. S. Blume, J. Bunders, L. Leydesdorff, R. Whitley (Dordrecht/ Boston: Reidel, 1987).
11. Of course, in addition to this substantive purpose science policy may also strive to improve the institutional management of research.

Notes continued from page 21.

4. Exemplary studies from the Tremont group include: Elihu Gerson, "Scientific Work and Social Worlds," *Knowledge* 4 (1983): 357-77; S. Leigh Star, "Simplification in Scientific Work: An Example from Neuroscience Research," *Social Studies of Science* 13 (1983): 208-26; Adele E. Clarke, "Research Materials and Reproductive Science in the United States, 1910-1940," in *Physiology in the American Context, 1850-1940*, Gerald Geison, ed. (Bethesda: American Physiological Society, 1987), 323-50; Joan H. Fujimura, "Constructing 'Do-able' Problems in Cancer Research: Articulation Alignment," *Social Studies of Science* 17 (1987), forthcoming.
5. Michael Schudson, *Advertising, The Uneasy Persuasion* (New York: Basic Books, 1984), quotations at 43 and 210. I have found the literature on advertising—much of it written by economists—dull and rarely pertinent to the arguments here, with one notable exception: Roland Marchand's *Advertising the American Dream* (Berkeley: University of California Press, 1985) is a beautiful sociological study of the role of advertising in cultural reproduction.
6. Hugh Rank, *How to Analyze Ads: The Pitch: . . .* (Park Forest, Illinois: The Counter-Propaganda Press, 1982), 98.
7. Schudson, *Advertising*, 215.
8. I am grateful to Mr. William Schmidt of the Coca-Cola Museum in Elizabethtown, Kentucky, for the opportunity to photograph from his fine collection of Coca-Cola advertisements. For a history of Coca-Cola, cf. Pat Watters, *Coca-Cola: An Illustrated History* (Garden City, N.Y.: Doubleday,

12. See for a detailed description of the methods L. Leydesdorff, "Frames." Additionally, in this study factors have been extracted obliquely to test whether they were related among each other.

13. This limitation is introduced because of cost-effectiveness: searching citing-patterns in publications without access to the ISI-tapes requires considerable connect time with the host.

14. These journals are: the *Journal of the Structural Division ASCE*, the *Journal of the Water Pollution Control Federation*, *Water Research* and the *Journal of Geophysical Research*.

15. The fourth entry journal, the *Journal of Aircraft*, has not been included in the quantitative analysis because it is included only in the Cited Journal Package of the JCR.

16. About inclusion in the Science Citation Index, see S. Maricic, "Scientific Journals: Selection Criteria for Information Services," *4S-Letters* 5 (1980/1), 6-8; E. Garfield, *Current Contents*, November 5, 1979. (Also in *Essays of an Information Scientist*, vol. IV, 309-312 (Philadelphia: ISI-Press, 1981).

17. In the printed edition four additional book titles could be found, but 10 article titles were not found! These differences seem to us a relevant argument in the discussion about the use of the printed or the on-line edition of the SCI for scientometric research. See, for example: J. Irvine, B. R. Martin, "Basic Research in the East and West: A Comparison of the Scientific Performance of High-Energy Physics Accelerators," *Social Studies of Science* 15 (1985), 309; H. F. Moed, A. F. J. van Raan, "Critical Remarks on Irvine and Martin's Methodology for Evaluating Scientific Performance," *Social Studies of Science* 15 (1985), 545.

18. The reason for the low values in 1984 is that the analysis was conducted until December 31, 1984 as the date of entry, while some of the 1984 publications were not published and registered until 1985.

19. See note 15.

20. One should keep in mind that the "wind energy" set is empty for 1978, 1979 and 1981, and hence does not contain any references.

21. A. Rip, P. v. d. Schaar, "Het Nationaal Onderzoeksprogramma Windenergie," in *Implementatie van Prioriteiten in het Wetenschappelijk Onderzoek bestudeerd aan de hand van enkele casestudies*, eds. A. Rip, R. Hagendijk, H. Dits (s-Gravenhage: Staatsuitgeverij, 1986); M. Jochem, "Waarom Wind-en Zonne-energie de markt nog niet hebben veroverd?" *Wetenschap & Samenleving* 8 (1986), 20-25.

22. *Zonne-energie in Nederland. Programma voor de tweede fase van het Nationaal Onderzoeksprogramma Zonne-energie (1982-1985)*, Bureau Energie Onderzoek Projecten (BEOP)-15, (Petten: Energieonderzoek Centrum Nederland, 1982).

23. *Energieaspecten* 1984, no. 4, 260; *Energieaspecten* 1985, no. 5/6, 14.

24. On the choice of the unit of analysis in cognitive or social terms, see also: H. M. Collins, "The Possibilities of Science Policy," *Social Studies of Science* 15 (1985) 554-558; B. Martin, J. Irvine, "Evaluating the Evaluators: A Reply to Our Critics," *Social Studies of Science* 15 (1985): 559.

1978) or Oliver Thomas, *The Real Coke, The Real Story* (New York: Random House, 1986). I also wish to thank Carl Briggs for photographic assistance.

9. Scientists are of two minds on the use of science in advertising and, more generally, on its presentation in mass media. The ambivalence is noted in Dorothy Nelkin's brand new book *Selling Science: How the Press Covers Science and Technology* (New York: W. H. Freeman, 1987 at page 169): "Scientists today see improved press coverage as a means of fulfilling their obligation to bring science to the public and attracting support from legislators, corporate leaders, and foundation executives. But they have also carried over values from a time when science was less accountable and more isolated from public affairs. . . . [Scientists] worry about the corruptive influence on science of self-promotion and the encouragement of scientists more skilled in public relations than in research."

10. I thank Anne Figert for this example.

11. Schudson, *Advertising*, 27.

12. The boundary between science and non-science has been the object of earlier work: Thomas F. Gieryn, "Boundary-Work and the Demarcation of Science from Non-Science: Strains and Interests in Professional Ideologies of Scientists," *American Sociological Review* 48 (1983): 781-95. This endnote is an advertisement for my forthcoming book, *Boundaries of Science: Theory and Episodes*.

Endorsing Referee:
Michael Mulkay