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Conversational Data Analysis as an Altered State of Consciousness.

Andrew M. Greeley

Norman Nie was nothing if not candid as to the reasons why I was chosen to speak to you this evening. He said, "We want somebody who doesn't know a bit from a bite, but who has had a lot of experience with SCSS." I qualify on both counts. Biting is something you do to a bullet, and bit is what's left over in the paycheck after the government takes its taxes away. As for the use of SCSS I've done most of a book relying solely on my portable TI terminal and, with some risk of having a giant skyhook come down and removing me from the scene tonight, I think I can say I have analyzed more data with it than Norman has.

I should like to advance for your consideration tonight out of my own experience with the conversational data analysis a highly speculative suggestion. The development of conversational computer software will be even more revolutionary in the disciplines of data analysis than the breakthroughs a decade or more ago which eliminated the need to compute regression coefficients by hand. Quantitatively—that is to say, the time saving differences—in using the conversational comp technique, I suggest, will seem to be relatively minor compared to the qualitative differences. Briefly to summarize my thesis, the conversational technique will unleash the creativity of the data analyst—if he has any—as it has never been unleashed before. All analysis is a mixture of science and art. With the conversational computer, the art dimension of analysis will become more important; flair will become the critically important attribute of the good analyst; and creativity will seek to burst the bonds imposed on it by the hyper-rigid "scientific method" demanded by the professional journals—which seem not only not to value creativity and flair but to deny their existence. To state my speculative thesis at its most outlandish: the interactive system will force us finally to realize that data analysis is a form of poetry.

Since most of you have not had the experience yet of using the conversational system, I must describe to you an experience which you have had which is like (you should excuse the expression) peak experiences with conversational analysis.

All of us who do data analysis know what it's like when the pieces begin to fall into place—usually when we have started (however belatedly) to write our reports. We have poured over output, sorted out tables, rearranged chapter outlines, done a few final batch runs, and then suddenly we see it all—the whole of our analysis and its integrated parts. Our thought processes at last "flow" (to use a word I will return to later) and so does our pen or typewriter—though usually less rapidly. The experience is a bit of a high, we feel like a detective who has at last solved a mystery, a puzzle addict who has charted his way through another maze, an explorer who sees the way home. Sometimes the flow breaks down, sometimes it never happens and our report is pedestrian, sometimes we wish we had time to order more runs so that we can go off on a creative tangent but of course there is no time. The report will be done, but alas it would be so much more brilliant if we could indulge ourself in that one last table—

which might take an hour, a day, three days to produce, just when we don't have fifteen minutes.

I propose to suggest to you tonight that what a conversational system like SCSS does is to move back the possibility of the "flow" experience from report writing to the very beginning of analysis—and thus release, at least on occasion, tremendous resources of creativity which are locked up in each of us—or to be more conservative if you wish, locked in many of us.

I would submit that this breakthrough will be stoutly resisted by those who value rigid distinctions between art and science, and by those who think there is no room for flair or poetry in the "serious" business of data analysis. I hesitate to predict the outcome of the battle. Melancholy Celt that I am, I observe that there is little premium on flair and poetry in contemporary American social research, and that very few "serious" research scholars are prepared to admit that their best findings occur in the "altered state of consciousness."

Let me say in passing that it may well be that the conversational computer puts analysts in the relatively similar position to mathematicians and computer programmers, both of whom, in some sense, have immediate access to their "data," and for whom flair, creativity, and elegance are taken for granted as valuable attributes. I shall have to leave it to the mathematicians and programmers among you as to what I'm going to describe tonight is an experience analogous to one you have perhaps every day. My one analogy, however, is not with mathematics or programming but with another, perhaps not dissimilar one of creative endeavor: poetry and story telling. Playing with the data through SCSS for me is very much like playing with characters in a story and with sounds and images in a poem. All three are essentially aesthetic, creative experiences. And a hell of a lot of fun!

I intend to rely tonight on six different concepts—or perhaps, given what I am to say later, six different symbols—with which I will circle around the creative experience of using a conversational computer in order (you should excuse the expression) to try to paint for you a portrait of what it seems to me to be like. I shall talk of altered state of consciousness, of flow, bricolage, of the pre-conscious intellect, and of the illuminating intellect, relying especially on the work of Mihaly Csikszentmihalyi, Michael Polanyi, Claude Levi-Strauss, Lawrence Kubie, and Jacques Maritain. The first four "symbols" are largely descriptive; the last two, more precisely analytic. Within the limits of an after dinner speech, perhaps already too serious, I can only sketch my portrait. If you're intrigued, I give you the paints and let you fill in the colors yourself.

By an altered state of consciousness I mean the state different from that consciousness which marks our wide-awake, discursive, rational life.

Characteristic of all of these conditions is that it seems like someone else besides "I" has taken over. A muse, a demon, a deity, someone who is operating more or less independently of our explicit, conscious, rational self-control.

Michael Polanyi, in the closing years of his remarkable life, wrote extensively on personal knowledge or tacit knowledge; that is, the deeply insightful, intuitive cognition that we have about things before we "know" them in any self-conscious and explicit fashion. According to Polanyi, our great discoveries come not as clearly thought out answers, carefully prepared questions based on theoretical consideration according to the standard format of the

"scientific method." On the contrary, the great insights, the paradigm-shattering ones, to use the phrase of Thomas Kuhn, come before the answers and even before the questions. At some deep level in our personalities we intuit the truth about reality, and then, under the influence of this intuition, seek to ask the questions which will enable us to "surface" our insight as an articulated answer to the questions. This description of personal knowledge flies in the face of all we learned in our high school and college textbooks about the scientific method. It is truly not my purpose tonight to attempt to refute the "scientific method." I merely invite you to read Polanyi and to consider the account of Lavoisier who deposited in Paris in a sealed envelope three years before his great discovery a description of what that discovery would be.

Now I would submit to you, arguing merely from my own personal experience, that working with the SCSS has been for me an exercise in personal knowledge in an altered state of consciousness. I know what I'm going to find, in a very real sense, in the early process of looking for it without fully realizing for what I am looking; and I pursue these insights which I am not even able to articulate under the direction of some demon or deity or muse or leprechaun, whichever he/she may be. It is not the "I" that I am normally familiar with (this leprechaun, however, is first cousin of that good spirit which whispers into my ears the best lines in my admittedly still novice poems).

Norman (Nie) in an article awhile back, wondered whether this speed of computation might lead the data analyst down blind paths and off on wild tangents. It is a theoretically reasonable danger but I would suggest tonight that to the data analyst who permits his creativity to work the seemingly blind paths are not blind paths at all, and that the tangents are often the directions in which we should be going, in which our demon or our leprechaun is dragging us. We may end up with a different kind of paper than the one we started to write—as my paper on religious dis-identification turned into a paper on religious exogamy—but we will also end up with a paper we *should* have been writing in the first place if we were listening carefully to our deep insights and our intuitions.

Claude Levi-Strauss, in his discussions of symbolic myths, speaks of the French "artistic game" of bricolage. The artist or craftsman, working with a limited set of components—some string, a few rocks, some pieces of wood, some bits of wire—assembles, demolishes, and then reassembles constructs can represent as many different things as his playful imagination wants to make them represent. Levi-Strauss suggests that the myth makers operate in the same way. They have a limited number of images, pictures, metaphors, stories, symbols, and they endlessly rearrange, reconstruct, reorder their component parts into similar and yet diverse myths much like our dreams rearrange the experiences of our waking conscious life. It is clear that tellers of folk tales enjoy tremendous liberty in manipulating their limited resources to make many different though not unrelated points about the meaning of the human condition. Homer, for example, must have relied on a vast collection of divergent folk tales which in a work of sheer genius he wove into a seamless web. In Irish mythology the tales of Finn MacCool and of Queen Maeve—who was no better than she had to be and that wasn't very good in those days—are by no means part of a single well-integrated story (though sometimes attempts were made in the old sagas to force the divergent tales together), but are rather the creations

What often is not realized is that the same bricolage phenomenon is at work in both the Jewish and Christian scriptures. The book of Tobit, for example (which I suspect the Orthodox Jews among you would not want to consider as part of scriptures), is clearly composed of a number of folk tales and folk images that were "lying around" for the teller of the tale just as the pieces of string and wire and wood were "lying around" in a French farmyard. More importantly, the late apocalyptic literature of the Second Temple era was put together in substantial part by reweaving the Creation myths to be found in Genesis and which certainly existed, long before the writing of Genesis, in Hebrew folk mythology. So too even in the Christian scriptures there is no single account of the death of Jesus and then his followers' experience of him as still alive, but many different tales and traditions have emerged making rather different points out of the manipulation of the various components of pictures and stories.

I would suggest then that when one is playing with variables in a conversational analytic situation one is engaged in bricolage, constructing, demolishing, rearranging, modifying, building, taking apart, and rebuilding "constructs" from the limited set of components that are available. The fun and the challenge of the game, you see, is the limitation of the components, for if your components were limitless there would be much less challenge to the creative ingenuity. A child with a plastic construction set would hardly know what to do if he had all possible shapes and sizes of components. The great fun is in building as many plausible and implausible structures as he can from the parts with which mommy and daddy have equipped him. If conversational data analysis is indeed bricolage, or rather an exercise quite similar to bricolage, it would be important for SCSS to develop as soon as possible "datagraphics" capabilities so that one can actually see the constructs one is creating and manipulate the pieces just as the French barnyard artist (and similar folk artists all around the world) manipulate the pieces of their constructs.

Mihaly Csikszentmihalyi (Michael of the Mount of St. Michael, in case you're not familiar with your Hungarian) has developed the notion of "flow" to describe certain "peak" experiences of altered or quasi-altered states of consciousness. It is the nature of "flow" experience to push our talents and our skills out to their outer limits but not beyond that limit. The chess player faced with a difficult opponent, but one with whom he is well matched; the surgeon, performing intricate operations that is just inside the limits of abilities; the skier, performing a tricky slope that he knows he can master; the quarterback, "reading" the defensive secondary—all these experience "flow" states. Their disciplined, highly trained, carefully polished skills react quickly, automatically, smoothly, responding with casual decisiveness to every slight movement in the situation. It is as though the skills themselves take over and direct the person involved. John Brody, who once tossed a football for the San Francisco '49ers, described such an experience as a "slow motion" drama in which he could see his responses with the slowly unfolding defensive patterns even before he had responded. His skills as quarterback, in other words, "told him" what to do without his having to devote any conscious thought of the problem of, let us say, a free safety, leaving his position and crossing the field. Similarly, trial lawyers—or anyone else who must think on his/her feet—often

describe their responses in critical situations as words they never would have "thought" of themselves if they had time. The words just came, they "flowed" out of them. Similarly, when one is locked in dialogue with one's data in a conversational session one often experiences a "flow" between one's own analytic skills and the movements of the data. The process is automatic, but hyper-rational rather than irrational. One speeds through the data as a skier speeds down the mountainside.

I have suggested thus far, then, that interactive data analysis is an altered state of consciousness into which personal knowledge frequently asserts itself despite our explicit cognitive attentions in which we manipulate variables in an exercise something like bricolage and which under some circumstances an automatic "flow" between our analytic skills and the data takes place. But what exactly goes on in this altered state of consciousness? What is the nature of this "creative" process? Does a muse indeed take over and whisper in our ear, as some varieties of Platonic philosophy once suggested? Today that seems an absurd question, and yet, the poet, the artist, the painter I think will all testify that they do "hear" voices or do "see" visions. The model of a "muse" nicely subsumes the data. Alternately, is there a demon deep down in our unconscious swirling up out of the muddy waters of our dreams and taking over, directing us in our experiences of "flow," bricolage, and personal knowledge?

It does not seem altogether likely, for while the creative altered state of consciousness is creative but it may be non-rational in the sense of not being part of our discursive ordinary waking consciousness. It is anything but irrational. Doubtless there are elements welling up from the depths of our personality, but the skills themselves are highly disciplined, carefully refined, and quite specifically intellectual. The quarterback has his chart of the defensive secondary; the lawyer has knowledge of the law; the surgeon has elaborate mental diagrams of human anatomy; the chess player, a highly developed almost mathematical knowledge of the intricacies of the game; and the data analyst, the knowledge and the wisdom of his own discipline. So, too, the artist and the poet have elaborately developed skills in their crafts, skills which presume a solid intellectual grasp (that is not necessarily acquired at graduate school) of the capabilities of the media with which they're working. The creative process, in other words, seems to be something intellectual, but intellectual in a quite different way than our ordinary thought process is intellectual. Aristotle postulated an "active" or "agent" intellect, a dimension of the human personality, if you will, which not only received knowledge but actively "went out" to order the components from which knowledge would come. The Islamic Aristotelians in Spain in the early middle ages were so impressed by the power of this "intellectus agens" that they suggested that there was but a single such intellect for the whole human race in which we all participated—a construct not at all unlike, when push comes to shove, the Platonic muse. Most Platonists and Aristotelians, the, were so impressed with the power that takes over in the altered state of consciousness called creativity that they placed this power outside the human personality. Thomas Aquinas, the stable, sensible Neapolitan that he was, dismissed such a notion, and the creative intellect was put back where it

belonged—solidly within the personality of the ordinary individual—even if it was still seen as a spark of some higher Creativity.

If, therefore, creativity is neither in the daily consciousness, nor in the Freudian unconsciousness, nor in some Platonic or Aristotelian hyper-consciousness, where else is it? One runs out of prefixes and ends up with the notion of the preconscious. In the last several decades two very different individuals developed from very different traditions the notion of the preconscious intellect as the locus of human creativity: the psychoanalyst Lawrence Kubie and the Thomistic philosopher Jacques Maritain (in the A. W. Mellon Lectures in the Fine Arts at the National Gallery of Arts). This strange convergence of the psychoanalyst and the philosopher—of which the two men were apparently totally unaware—is a fascinating phenomenon, and while convergence does not “prove” the existence of a preconscious intellect, it does lend some plausibility to the model.

Be it noted, by the way, that one is dealing here with a model, a postulate to explain phenomena, rather than a clearly proven dimension of the human personality.²

First let us listen to Lawrence Kubie. He places the preconscious of the human personality between the rational and the unconscious.

There is however another type of mentation whose relationship to its roots is figurative and allegorical. The function of this intermediate form of mentation is to express at least by implication the nuances of thought and feeling, those collateral and emotional references which cluster around the central core of meaning. Here every coded signal has many overlapping meanings; and every item of data from the world of experience has many coded representative. This is the form of coded language which is essential for all creative thinking, whether in art or science. Therefore we will have much more to say about it below. In technical jargon, this second type of symbolic process is called *preconscious*.

. . . On the *conscious* level he [a scientist] deals with them as communicable ideas and approximate realities. On the *preconscious* level he deals with swift condensations of their multiple allegorical and emotional import, both direct and indirect. On the *unconscious* level, without realizing it, he uses his special competence and knowledge to express the conflict-laden and confused levels of his own spirit, using the language of his own internal struggles. Since this happens without his knowledge, it is a process which even in his own field can take over his creative thinking, distorting and perverting it to serve his unconscious needs and purposes, precisely as happens in a dream or in the symptom formations of neurotic and psychotic illness. (Author's italics; pp. 30-32)

Caught as it is between ordinary waking consciousness and the unconscious, the preconscious is in trouble.

Preconscious processes are assailed from both sides. From

symbols by unconscious drives which are oriented away from reality and which consist of rigid compromise formations, lacking in fluid inventiveness. From the other side they are driven by literal conscious purpose, checked and corrected by conscious retrospective critique. The uniqueness of creativity, i.e., its capacity to find and put together something new, depends on the extent to which preconscious functions can operate freely between these two ubiquitous concurrent and oppressive prison wardens. (Kubie, p. 45)

Might I note here in passing, incidentally, that one of the things it seems to me is that a conversational intercomputational system because of the very speed of its responses gives the preconscious an opportunity to elude these twin assaults. When you get instant turnaround and can react instantly to that turnaround there is not time for distortions of both the unconscious and the literal to interfere with the flow of your creativity.

Finally, Kubie believed that the preconscious exercise of creativity is essentially a matter of seeing new relationship—a bricolage exercise, in other words.

It is, I believe, a fair generalization to state quite simply that although the uncovering of new facts and of relationships among both new and old data is not the whole of creativity, it is the essential process without which there can be no such thing as creativity. Consequently creativity implies *invention*; e.g., the making of new machines or processes by the application of old or new facts and principles or a combination of them in order to uncover still newer facts and newer combinations, and to synthesize new patterns out of data whose interdependence had hitherto gone unnoted and unused. It is this which is common to all creativeness, whether in music as described by Mozart, or in painting as described by Delacroix and others, or in poetry as described by Paul Valery, A. E. Housman, etc., or in science as pointed out by Gregg, Claude Bernard, Richard Tolman, Richet, and other scientists. (p. 50)

Incidentally, later in the book Kubie compares preconscious activity to that of music—a comparison that he, without realizing it, has in common with both Plato and Maritain: "The extraordinary power of preconscious condensation is often demonstrated by a single thought which reverberates through the mind like a haunting melody." (p. 73)

Now to turn to Jacques Maritain, Creativity, "art," as Maritain calls it, is a "habitus, an inner quality or stable and deep-rooted disposition that raises the human subject and his natural powers to a higher degree of vital formation and energy, making him possessed of a particular strength of his own. . . a master quality, an inner demon if you prefer—has developed in us. . . is an ennoblement in the very kingdom of human nature and human dignity." (pp. 48-49) Creativity then is, or at least involves, first of all the disciplined skill. Nor is it to be found either outside the human personality or in the depths of the human unconscious. It is in "neither the surrealist inferno nor the Platonic heaven. I think that what we have to do is to make the Platonic Muse descend into the soul of man, where

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she is no longer Muse but creative intuition, and Flaubert's inspiration descend into the intellect united with imagination. . . (nor) is it a purely unconscious activity. . . but rather. . . an activity which is principally unconscious, but the point of which emerges into consciousness. Poetic intuition, for instance, is born in the unconscious, but it emerges from it; the poet is not unaware of this intuition, on the contrary it is his most precious light and the primary rule of his virtue. . . But he is aware of it. . . on the edge of the unconscious. (Underlining mine; pp. 90, 91)

Maritain concludes:

There are two kinds of unconscious, two great domains of psychological activity screened from the grasp of consciousness: the preconscious of the spirit in its living springs, and the unconscious of blood and flesh, instincts, tendencies, complexes, repressed images and desires, traumatic memories, as constituting a closed or autonomous dynamic whole. I would like to designate the first kind of unconscious by the name of *spiritual* or, for the sake of Plato, *musical* unconscious or preconscious; and the second by the name of *automatic* unconscious or *deaf* unconscious—deaf to the intellect, and structured into a world of its own apart from the intellect; we might also say, in quite a general sense, leaving aside any particular theory, *Freudian unconscious*. (Author's italics; pp. 91-92)

You will note how almost miraculously similar are the comments of Maritain and Kubie even in the reference to music. Maritain insists that this creative activity is an activity of reason but he defines reason to include something much broader than ordinary waking consciousness.³

Reason does not only consist of its conscious logical tools and manifestations, nor does the will consist only of its deliberate conscious determinations. Far beneath the sunlit surface thronged with explicit concepts and judgments, words and expressed resolutions or movements of the will, are the sources of knowledge and creativity, of love and suprasensuous desires, hidden in the primordial translucent night of the intimate vitality of the soul. Thus it is that we must recognize the existence of an unconscious or preconscious which pertains to the spiritual powers of the human soul and to the inner abyss of personal freedom, and of the personal thirst and striving for knowing and seeing, grasping and expressing; a spiritual or musical unconscious which is specifically different from the automatic or deaf unconscious. (p. 94)

Maritain goes beyond Kubie to give a name to the functioning preconscious. He calls it the Agent Intellect or the Illuminating Intellect. It is that part of our personality which analyzes and decomposes reality outside. It serves it up for the consideration of our conscious, rational, discursive mind. It is "a merely active and perpetually active intellectual energy. . . which permeates the images with its pure and purely activating spiritual life and actuates or awakens the potential intelligibility which is contained in them." (p. 97) It is that energy

which operates on the images gathered by our senses, drawing the intelligible content from these images. The illuminating intellect is spiritual sun ceaselessly radiating, which activates everything in intelligence, and whose light causes all our ideas to arise in us, and whose energy permeates every operation of our mind. And this primal source of light cannot be seen by us; it remains concealed in the unconscious of the spirit." (pp. 98-99)

Tonight is no time to detain ourselves over this model—basically Aristotelian—of the process of human thought. The point is that Maritain suggests the preconscious—the locus of creativity—is in fact a ceaselessly operating intellectual energy which is an essential part of the human act of knowing. Our images can either be in the automatic unconscious of Freud or in the spiritual preconscious; and it is precisely insofar as they are in the spiritual preconscious that they present the raw material of creativity. For those of you who may be tempted to dismiss Maritain as a reactionary Thomist, one can only point out that he is saying virtually the same thing as is the American psychoanalyst, Lawrence Kubie. For both the source of creativity is a "scanning mechanism" locked in the depths of the human personality but operating beyond the depths, ceaselessly exploring like a searchlight radar antenna, the world outside, and "locking on" to that world through the pictures and images it uncovers. The creative activity of the preconscious, freed temporarily from the constraint of literal reason, "takes over," releases our deeply intuitive personal knowledge, activates the smooth flow of our skills, and rearranges the components—dare one say the component variables—with which we are playing. It is, I would submit, a useful model until one comes along with something better.

Now perceive what happens in a batch computer operation. One has an idea, one puts in a request for a run. Anywhere from fifteen minutes to twelve hours later the idea is supported, rejected or modified. One tries again. And the next day and the day after that. The computer breaks down, it is a weekend, we must go to a meeting, we come back scarcely remembering what our original idea was. Flow is impossible, the preconscious is never unlocked, personal knowledge has no opportunity to articulate itself, and there is very little opportunity to play creatively with our variables. By giving us instant contact with our data the interactive computer system locks us into the data. Known subject and known object are merged; they almost become one; we play with our variables with the way a poet plays with sounds, images and pictures. We need not of course be creative in an interactive session; often we are not; and sometimes we can be creative in batch analysis. I am merely suggesting—in part, on the basis of personal experience—that we are a hell of a lot more likely to be creative when we and our data are in instant contact.

Might I suggest that there is an affective dimension to this contact. Any union between subject and object which is intense, passionate, and which activates our preconscious creativity is, analogously at any rate, a union of love, and love is by far the most powerful form of knowledge, for love gives us eyes to see that we would never have seen before. One sees lovable qualities in the beloved not before the act of love but in the act of loving, and afterwards, in the light of that act of love. It is not romantic exaggeration, I suggest, but rather strict analogy by which I intend to suggest that the principal contribution to be made by conversational systems is that they make possible affective unions between the knower and the known, between the analyst and his data. The analyst be-

comes seduced into emotional involvement with his data, and through the force of that emotional involvement, comes to know the data far better than he otherwise would.⁴

If you SCSS users are anything like the SCSS makers then I'm sure you've read the article, "Joelle," by Poul Anderson, in the Fall issue of *Isaac Asimov's Science Fiction* magazine. "Joelle" is a new breed of human, a mutant, capable of linking herself through a computer not merely to the data about the world but to the world itself (Norman and Tex have been hunting for her, trying to sign here on as a programmer). Eric, her love, tries desperately and unsuccessfully to accompany her. He fails because her love for the *real* that she encounters in her explorations is much greater than her love for him. Listen to a description of Joelle and Eric on exploration not merely of the data but of the world of sub-molecular genetic research.

Her brain ordered the appropriate circuits closed, and she was joined to the complex of instruments, sensors, effectors, and to the entire comprehension man had of the chemistry of life. Receiving from her, Eric perceived.

He got no presentation of quantities, reading on gauges whose significance became clear after long calculation. That is, the numbers were present, but in the experience he was hardly more conscious of them than he was of his skeleton. He was not looking from outside and making inferences, he was *there*. (Author's italics)

It was seeing, feeling, hearing, traveling, though not any of those things, for it went beyond what the poor limited human creature could ever sense or do, and beyond and beyond.

The cell lived. Pulsations crossed its membrane like colors, the cell was a globe of rainbow, throbbing to the intricate fluid flow that cradled it in deliciousness, avidly drinking energies which cataracted toward it down every-changing gradients. Green distances reached to golden infinity. Beneath every ongoing fulfillment dwelt peace. The cosmos of the cell was a Nirvana that danced.

Now inward, through the rainbows, to the interior ocean. Here went a maelstrom of...tastes...and here reigned a gigantic underlying purposefulness; within the cell, work forever went on, driven by a law so all-encompassing that it might have been God the Captain. Organelles drifted by, seeming to sing while they wove together chemical scraps to make stuff that came alive. As the scale of his cognition grew finer, Eric saw them spread out into Gothic soarings, full of mysteries and music. Ahead of him, the nucleus waxed from an island of molecular forests to a galaxy of constellated atoms whose force-fields shone like wind-blown star-clouds.

He entered it, he swept up a double helix, tier after tier of awesome and wholly harmonious labyrinths, he was with

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Hoelle when she evoked fire and reshaped a part of the temple,
which was not less beautiful thereafter, he shared her pride and
her humility, here at the heart of life. (pp. 181-82)

I am not suggesting (perish the thought; or should I say, heaven forefend) that this is the next direction in which the SCSS wizard should go. Nor am I predicting that any of your descendants will be able to go on such a journey. The purpose of good science fiction, I take it, is to illumine the present rather than to predict the future. SCSS isn't going to get us down through the double helix so that we can literally rearrange it. It does something much more modest but similar—it brings us in the closest and most immediate—yes, I'll say it—the most loving contact with our data that has ever before been possible in the kind of analysis we folks do. It does permit us on occasion to have experiences which in some quite small way are not unlike the joy of discovery that Poul Anderson describes in his story.

No small achievement.

National Opinion Research Center
University of Arizona

NOTES

¹Lawrence Kubie, *The Neurotic Distortion of the Creative Process*. New York: Noonday Press, 1961; Jacques Maritain, *Creative Intuition in Art and Poetry*. A. W. Mellon Lectures, Bollingen Series. New York: Panteon Books, 1953; Michael Polanyi, *Personal Knowledge*. London: Routledge & Kegan Paul, 1958; Mihali Czikszenmihalyi, *Beyond Boredom and Anxiety*. San Francisco: Jossey-Bass, 1975; J. W. Getzels and Mihali Czikszenmihalyi, *Creative Visions*. New York: Wiley, 1976; Claude Levi-Strauss.

²I will leave it to those engaged in research on the hemispheres of the brain on which side they should locate the preconscious intellect. I would only insist—an error perhaps as my boyhood Thomism reasserts itself—that it is not a hemisphere of the brain which knows, *I know*; it is not a hemisphere of a brain which wrestles models out of the University of Chicago's 165, *I do it*. The philosophical and theological implications of such an assertion, while fascinating, are beyond the cope of this year's after dinner speech. When Norman programs a computer to speak back to us in Hebrew, it might be another matter.

³Incidentally, Maritain has a diagram on page 108 of his book, and Kubie, on page 40, which are strikingly similar in their contents if not in their graphics.

⁴I realize that the above is completely at odds with the dominant philosophical assumption of our time, namely, that there cannot be union between object and subject. It is not my purpose tonight to deny that assumption (though I think Bernard Lonergan effectively demolishes it in a book, *Insight*), but merely to assert the common sense experience of all of us who analyze data that the union between object and subject are not only possible, but that it happens all the time.

