MULTIPLE PERSONALITY, ALTERED STATES AND VIRTUAL REALITY: THE WORLD SIMULATION PROCESS APPROACH

Charles T. Tart, Ph.D.

Charles T. Tart, Ph.D., is a Professor of Psychology at the Davis campus of the University of California and a Senior Research Associate of the Institute of Noetic Sciences in Sausalito, California.

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For reprints write Charles T. Tart, Ph.D., Department of Psychology, University of California, Davis, California 95616-8686.

ABSTRACT

A new technological model of consciousness is that of ***computer-generated virtual reality****. By wearing goggles containing color TV sets and earphones, a computer can control a person's main sensory input, coordinating it with actual body movements tracked by sensors, giving the "traveler" a virtual body that can interact with virtual objects. More than one person can enter the same virtual reality and interact with other travelers there. Given psychological identification, a virtual reality can quickly become an almost total reality. Developing applications, such as those in architecture, are discussed. Contemporary neurology and psychology show that we already live in one or more internal virtual realities, generated by neurological and psychological processes. Stable patterns, stabilized systems of these internal virtual realities, constitute* ***states of consciousness****, our ordinary* ***personality****, and* ***multiple personalities****. Computer-generated virtual realities offer intriguing possibilities for developing diagnostic, inductive, psychotherapeutic and training techniques that can extend and supplement current ones.*

TECHNOLOGY AND MODELS OF CONSCIOUSNESS

Historically, attempts to understand human consciousness involve a constant interplay between (a) various observational methods, such as introspectively going inside and seeing what is there, direct experience, or observing other people's behavior and verbal reports, and (b) theoretical work, devising frameworks to order and make sense of that knowledge. We are never satisfied with just raw experience; we like to get a feeling that it makes sense, that it falls together in some kind of pattern. The formalized interplay between observation and theorizing is the essence of scientific method.

The way people have theorized about consciousness in different eras has often been based heavily on the more advanced technology of the day. If you examine Freud, for instance, you can find the technology of the steam engine and the science of hydraulics implicit in many concepts. There is material about pressure and pressure releases, about the flow of fluid (libido) and so forth. The symbolic release of libidinal tension in a dream, for example, is functioning as a safety valve for libido just like the safety valve on the boiler of a steam engine. The safety valve is set up so if the pressure gets beyond a certain point it just bleeds steam off in an impressive, but harmless hissing. When drives of the id get too strong, dreams bleed off that excess drive in the form of hallucinatory gratification.

When telephones came along, with their central switchboards to connect you to a specific phone, people got very fascinated with telephone switchboard analogies for the brain and consciousness. Our contemporary model is the digital computer. We invented computers that would do the sorts of things that we normally associate with intelligence, such as adding numbers, retrieving data and making decisions, so we started thinking the mind is like a computer. This technological model is still very much with us, although we are beginning to see some of its limitations.

All models in science are terribly convenient but also dangerously misleading. As long as we can remember that any of these models and theories are just and only that, simply mental frameworks for organizing knowledge, there is no problem. Hopefully they will inspire us to keep looking and discovering new things. The trouble is that we fall in love with our models. We get attached to a particular formulation, a particular set of ideas, and then the model or theory becomes dangerous because it starts to restrict us. We subtly distort our mental processes to protect and embellish the beloved theory instead of continuing to test it against data.

Korzybski (1958), the founder of semantics, is well known to all of us for his statement that the map is not the territory. Psychologically speaking, he should have added that, "Most of the time we prefer the map." The map is organized and orderly. The territory tends to be messy and inconsistent.

This paper will present some concepts about the nature of altered and ordinary states of consciousness that can potentially unify disparate approaches and observations, an approach based on modern systems theory. This systems approach (described in a series of papers, beginning with Tart, 1972a; 1972b; 1974; and presented fully in Tart, 1975), as I have extended it here and elsewhere (Tart, 1987) can help make some order of much of the data on multiple

personality. The new technology to be described, that of *virtual reality*, fleshes out this systems approach nicely, as well as being of considerable interest in itself and offering potential practical applications. But remember my warning about our tendency to fall in love with models and then be used and restricted by them, rather than using them for our own growth.

I shall first describe this new technology and some of its uses, then apply it to concepts of personality and states of consciousness. As this application is in its infancy, I hope others will be stimulated to test and expand it.

Flight Simulation

The line of development leading to current computer-generated virtual reality work started out during the Second World War in a crude form, based on the need to train large numbers of pilots quickly and efficiently. When you want to train somebody to fly a plane you first give them many hours of book and classroom instruction. That is useful up to a point, but then they actually have to get in a plane and fly it. You can do that with dual control planes and an instructor to ease your trainee into flying, but eventually pilots have to fly by themselves. Unfortunately, training is not a 100% successful act: a certain proportion of pilots, before they become good, crash and die. You have lost a human life and a very expensive piece of machinery.

During the Second World War trainers began devising crude flight simulators, such as the Link Trainer. Imagine a toy airplane big enough to sit in, mounted on a vertical metal post. You are sitting in its "cockpit." When you turn the wheel one way it tilts, when you turn it the other way it tilts the other way, etc. You had to forget that you were playing with a sort of toy and concentrate on the task. Crude, but it was useful in beginning to give would-be pilots a little bit of feel, "seat-of-the-pants" knowledge, vestibular knowledge of what actually happens when you push these controls. That kind of experiential knowledge is vital for successful flight.

Contemporary flight simulators have come a long way. Today you open the door of the simulator and when you step inside you are in a perfect replica of the cockpit of the specific modern plane you want to learn to fly, say a commercial passenger jetliner. You see the runway out the windscreen in front of you, with normal runway activity going on.

In your mind, of course, you know you're in a box mounted on springs and pistons and that what you see through the windscreen is only a videotape of the runway, not a real runway. You know that intellectually, but it looks real. You sit in the seat, buckle up and start the engines. You hear the engines start, feel the rumble and vibrations, see the engine gauges read appropriately. After you warm them up, judging by the temperature gauges and the smoothness of their sound and vibration, you begin to taxi down the runway. You *see* the runway moving away behind your field of vision through the windscreen, *feel* the vibration of the plane rolling along the runway, and *hear* the appropriate sounds.

At this time most of us, were we in this situation, could intellectually access the knowledge that this is just a *simulation* of reality, but it is beginning to get pretty real. You can take off and, if you have done it correctly, you see, hear, and feel the plane take off. Your view becomes a view from up in the air, and you can go on to practice landings and so forth.

Here is where the great practicality of simulator training comes in. Besides just accumulating many hours of practice, your instructor can put you into various emergency situations. Two of the four engines may fail suddenly, for example. Or the plane may suddenly rock from strong headwinds. You can feel the sense of acceleration and deceleration. You must struggle with the controls. When you do the wrong thing your plane crashes! You see, hear, and feel it heading toward the ground, WHAM! There is a tremendous noise, flashes of light, and the windscreen suddenly prints out a message saying that you made a fatal error and just *how* you made that fatal error. But in a flight simulator, you live to learn and fly another day. This is much easier on pilots' lives and multi-million dollar aircraft than training too soon in the real thing.

I believe that today many airlines will not let any pilots fly certain aircraft until they have logged in hundreds of hours on a simulator for that aircraft. Indeed, the simulations are so good that trainees sometimes get disoriented when they step back out into ordinary reality. They know at a gut level that they have been flying this airplane. The mind became identified with the simulation and made it perfectly real. They step out of the cockpit door and they are suddenly up on a catwalk beside a huge box in a room full of machinery. They expected to step out into the airport.

There are three places where we non-pilots can experience how good flight simulators have become, namely at Disneyland in Los Angeles, Orlando, or Tokyo. They have a passenger spaceship simulator there called Star Tours. There are many adventures along the way, and it all becomes quite real. I should warn you, however, that this simulator experience is rather undignified. I was quite ashamed of and embarrassed by all the adults sitting around me screaming at the top of their lungs, as if they were in real danger. At least I think they were screaming all the time: it was hard to hear them over the sound of my own screaming! Simulation can readily become experiential reality.

Flight simulators are very expensive because they are so mechanical. You need an exact physical replica of the cabin of the particular airplane (or spaceship) you are simulating, huge springs and hydraulic pistons to physically move the simulator cabin in various ways to get acceleration, deceleration, pitch and yaw effects, loudspeakers and audio systems to get appropriate sound effects, projection televisions or movie projectors to put the right images on the windscreen, computers and sensors to coordinate all these effects, one or more operators to run the thing, and many technicians to maintain it. It is an excellent investment compared to crashing big airplanes and losing lives, though. The military has the best simulators in the world, but their enormous cost limits their use to a selected number of applications, and necessitates that only a small number of individuals experience them.

Virtual Reality

While mechanical flight simulators also use electronic devices and audio and visual aids, an enormous leap in progress has come from relying primarily on computer controlled visual presentation devices that mount right on the eyes. This approach began in 1965 with Sutherland's work at MIT and the University of Utah (Sutherland, 1968).

The latest developments in computer technology have eliminated most of the expensive mechanical aspects of simulation and brought the 1990 cost down to about $430,000 for a computer-generated virtual reality for two. Further developments will put this within the reach of ordinary people before the year 2000. I would not be surprised to see $20,000 systems within five years. For better or worse, we will start the new millennium with a significant portion of the population of Western countries able to voluntarily enter another world of experience and shape that experience to their desires.

Let me describe the current state of computer-generated virtual reality, as currently functioning and envisioned by its best known developer and exponent, Jaron Lanier and his associates at VPL Incorporated at Redwood City, California, and by others at such companies as Autodesk in Sausalito, California, where they prefer to call it *cyberspace*™, a term first used by novelist William Gibson in his popular novel *Neuromancer* (Gibson, 1984). I will draw from my one personal experience of the VPL system (when it only had partial capability) and others' experience. Some of what I describe will have been vastly improved by the time this paper sees print.

To experience computer-generated virtual reality at VPL, you put a special data glove on one hand. This glove tells the computer what you are doing with each finger of your hand, and where your hand is at each moment in three dimensional space. Are you pointing with some finger? Are you opening your hand? Are you grasping? Are you moving your hand forward or back? Rotating it? A simplified version of the sensing glove (the Mattel Company's "Power Glove") is available on the mass market for Nintendo video games.

A position sensor in a cap on your head provides similar information on where you are looking: have you tilted your head back? Rotated it so many degrees to the left or right? Looking down?

Under development, but commercially available only in prototype form, are various forms of a full body suit which is full of electronic sensors that tell what you are doing with your body. Are you raising your arms, are you stepping forward, etc.? All this information about what you are actually doing with your physical body is fed instant-by-instant to a very fast computer.

You also don stereo earphones and a special headset (EyePhones™) that look like a pair of goggles from the outside. This places a miniature color television set right in front of each eye, filling your visual field, so you see what the computer sends you and you hear what it feeds you through earphones. Technically, the quality of the pictures on these miniature televisions is blurry and grainy at this stage of development. Yet after a few minutes you are no longer consciously aware of this shortcoming: phenomenologically your brain takes over and makes it into normal-seeming visual input. The apparatus is now turned on, and you make your entry into computer-generated virtual reality.

If we want to make a gradual transition from ordinary reality to computer-generated virtual reality, we would have television cameras and microphones mounted on the "traveler's" head, and you, the traveler, would see and hear pretty much as if you had no apparatus on. You would see the walls and furniture of the room, the people in it, hear the ambient sounds and noises, etc. You could see your arm in front of you or, looking down, see your body. Our brains are hardwired to construct a feeling of self at the point of convergence of our sensory inputs, what Neisser calls the *ecological self* (Neisser, 1988). For the moment, you experience yourself as a "normal," embodied being in an ordinary place.

One use for this technology is in developing "telepresence," in which television cameras, microphones, etc. are mounted on a robot. This robot can go where it might be impossible for you to go, yet you would sense its environment and operate it by remote control. With good enough sensing and feedback on the consequences of your actions, it would be as if you were present. By identifying with the display, you would be, phenomenologically speaking, present at the distant location.

Either you or the person running the computer can begin to change your experienced reality now. For instance, what would it be like if the walls in the room gradually became pink instead of brown? You would see the walls take on a pink color, slowly or quickly, depending on how the change was programmed. Asked to turn around, you might see an ornamental fish pond in the middle of the previously solid floor with fish swimming around in it! You could walk around it and look at it from various angles, with the views all being "appropriate" to ordinary visual experience— if the virtual reality created by the computer was programmed to duplicate normal visual effects.

You could reach down to the water, see your arm reaching out (remember the computer knows where your arm is and is creating a virtual image of it for you to see) and grab one of the fish, pick it up and examine it. The fish might squeal, or perhaps talk with you! At this stage of the technology the apparatus does not exist to make you feel wetness when you put your hand in the water or feel the weight and texture of the fish you pick up, but it is coming. Chances are, though, that you are so fascinated by the computer-generated virtual reality experience by this time that you hardly notice little things like the lack of wetness of the water or weight and texture for the fish.

An outside observer sees a person wearing a funny suit, gloves, and goggles who looks as if he is either crazy or is intoxicated with some sort of drug like marijuana, a person who is on some kind of "trip." Even in the earlier work with computer-generated virtual reality, with just the data glove and EyePhones™, the VPL researchers repeatedly observed behavior similar to that of many people when they first became intoxicated with marijuana (Tart, 1970; 1971) and discovered the radically sensory alterations that can result. The person wearing the simulation apparatus would be exploring a particular computer-generated virtual reality, but not really identified with it yet. Suddenly she would hold

her hand in front of her face and say things like "My hand, look at my hand! Oh, wow! It moves!" That is the moment when the intellectual knowledge that you were taking part in an experiment with an electronic *simulation* of reality slips far into the background and suddenly you are *in* the new reality.

Constructing Computer-Generated Virtual Reality: An Example

Let us examine how a computer-generated virtual reality is constructed in more detail, taking the simple example of looking down at your hand in a virtual reality we might call "Swim and See World."

Suppose I look down at the spot where, based on my tremendously overlearned motor memory and body image, I expect my left hand to be. Given the parameters of Swim and See World, I see my "hand" as hand-shaped but colored pale green, with a small (but rather startling) blue eyeball on the back of it, and with bright red webbing between the four fingers and the thumb. This perception (via the color video monitors in front of each eye in my goggles) is instantaneous and whole as far as my consciousness is concerned. I look at my hand and that is what I see.

My green, webbed hand appears against a luminous blue background of subtle swirls, like moving water, and there are fish swimming in the periphery, but I am probably so taken by the appearance of my hand that I do not notice these background elements.

Technically, the position sensors on my helmet inform the computer that I am looking at a spot where other position sensors indicate that my left hand is. Given its simulation parameters, the computer "instantly" (as far as the speed of consciousness is concerned) generates an image of a green, red webbed hand with eyeballs on it. This hand is spatially oriented the same way my actual hand is to produce a match between kinesthetic and visual input. If I wiggle the fingers on my hand I generate kinesthetic sensations and the visual image of my hand also wiggles in accordance with my kinesthetic perceptions. If I move my hand I feel it moving and the visual perception of my hand moves appropriately.

I may be initially startled by the sight of my green, webbed, eyeballed hand, but there is a good chance that within a few minutes, if not much sooner, I will psychologically *identify* with this hand. It will be *my* hand. My nervous system will adjust to the new pattern of perceptions. Let us look at the nervous system aspects of this now and the psychological aspects of identification later.

We should not underestimate the ability of our nervous systems to make massive readjustments to sensory reality. Some examples I find most impressive are the old psychology experiments (pioneered by Stratton, 1897) in which subjects wore inverting goggles for a week or more while living their ordinary lives (see, for example, Snyder & Pronko, 1952). These goggles turned the visual world upside down! The floor was up above, the ceiling down below. Reaching out your arm in a direction that felt kinesthetically up resulted in seeing your arm moving down. Initially subjects were totally disoriented, nauseated, and often unable to function in the world without exercising extreme care and constant intellectual compensation for their reversed visual field. The amazing thing, though, was that within a few days for most subjects their visual world again appeared "normal," even though it was still upside down on the retinas of their eyes. They could function just fine! When they finally removed the goggles, the world immediately appeared upside down to their ordinary eyesight! It again readjusted, though, usually within a day or so. This is a startling demonstration of the constructed nature of ordinary perception.

Returning to the construction of the virtual reality of Swim and See World, the eyeball on my hand is, so far, not functional, but this reality could be programmed even more cleverly. If there were a couple of sensors to detect when I performed some arbitrary action, say wiggling my ears, the computer could then put an image in front of my eyes of the view of Swim and See World *from the perspective of the eyeball on my left hand.* I could see what was behind me, for example, by putting my hand behind my back. Another wiggle of my ears could restore "normal" vision.

VARIETIES OF VIRTUAL REALITY

To date there have been numerous virtual realities, worlds of experience, created at VPL. One of the earliest is an Alice in Wonderland world. You can inspect and handle objects, and walk around in this world, which looks like a Victorian nursery. Then you can shrink your virtual, visually perceived body and you are looking at everything in this nursery from the perspective of somebody who is only a foot high! Or you can grow taller and look down at the nursery, with its furniture looking like doll house furniture.

You can change the way in which basic physical "laws" work in computer-generated virtual reality. A colleague of mine picked up a piece of furniture while he was very tall in the Alice in Wonderland world. He saw himself picking it up, but when he let go of it, it floated in mid-air! He was amazed. The programmers told him they had not bothered to turn on gravity in this simulation, and asked him if he would like it turned on.

Virtual worlds can be made surreal. In one of the earliest created, you find yourself in a room floored with big, hexagonal tiles, each glowing from within. There are colored hexagonal pillars around the edges, each with a pulsing, flaming crystal on top. You can wander around this room and examine the pillars. One "explorer," crawling around on the tiles, discovered a little crack between the pillar and the floor, crawled into the crack, came up inside the flaming crystal and discovered the "flame" was a bird of paradise flying inside the crystal! In our "outside reality," of course, observers saw a quite mad man crawling about on the laboratory floor, apparently "hallucinating." I imagine many readers are already thinking about potential applications of virtual reality technology to understanding "madness."

A major source of identity in any state is your perception of your physical body. Ordinarily we take it for granted, not realizing what a psychological impact it has on us. In computer-generated virtual reality, you can have an externally perceptible "body" that is made to order: when you look down at it, you will see what the computer creates, and it will move and respond appropriately. It can be bigger or smaller, fatter or thinner, beautiful or deformed, male, female, or neither,

animal or human. In my last conversation with Jaron Lanier he mentioned that having four arms and learning to use them turns out to be quite straightforward in computer-generated virtual reality! As you learn to control the movements of your extra arms they become psychologically "natural," a part of *you.*

PRACTICAL APPLICATIONS OF VIRTUAL REALITY

Virtual reality will lead to the ultimate "video games" for entertainment, as well as practical training simulators like our present day flight simulators. Another practical application, pioneered by Fred Brook's team at the University of North Carolina (UNC), with a version being developed commercially for release in the future by Autodesk of Sausalito, California, is for architects.

Today an architect designs an expensive building for a client. The only preview of it before it is built is through blueprints, may be a model of the external appearance, and lots of imaginative skills in visualizing what the actual building will look like. If the imaginative "skills" turn out to be imaginative fantasies, the finished building may not be satisfying, and a lot of money has been wasted. In the UNC virtual reality, the architect and client both don helmets while walking on treadmills and steering with handlebars— rather like pushing a shopping cart— and together stroll through the designed building in computer-generated virtual reality, seeing everything from appropriate perspectives in three dimensions and color. Sunlight enters windows in the same way it will in the actual building for the time of day they inspect the virtual building.

Architect and client can be in a room, for example, and decide the door placement does not look right. A wave of a magic wand (easily created as a control system in computer-generated virtual reality) and the door is slid along the wall to the new placement to see how it looks. Or the natural light in a room looks fine now, but will it glare into workers' eyes late on winter afternoons? Move in virtual reality to a late winter afternoon time and see! Thousands or millions of dollars that might go to remodeling or correcting errors can be saved in any large building project.

SCIENTIFIC MODELING WITH VIRTUAL REALITY

Consider the potential use of computer-generated virtual reality for stimulating our scientific understanding. I have discussed one such use with a colleague at the University, Donald Owings, who studies the natural behavior of ground squirrels and rattlesnakes, which exist in a prey-predator relationship. Much of his work is observation in the field.

On one level you could say this investigator makes strictly behavioral observations and then creates theories to explain the observations, particularly their ecological implications. On another level you could see this work as an attempt to understand the "world views" of ground squirrels and rattlesnakes.

Suppose everything that has been learned to date about ground squirrels, rattlesnakes, their interactions, and their environment could be put into a simulation world, a computer-generated virtual reality. To a much greater extent than is now possible, you (and your colleagues) could see and hear the world from the point of view of a ground squirrel, walk through the tunnels a ground squirrel lives in, know what it is perceptually like to be in a world where the grass is as tall as you, and what it is like when a rattlesnake comes slithering down your tunnel! What kind of insights would that give you into what it is like to live in that kind of world? It could suggest new research, which in turn generates more data to be fed back into the computer-generated virtual reality model. This updating makes it more and more an accurate simulation, which allows an even better understanding of what the life of a ground squirrel is like, and so forth, on and on.

With my interest in altered states of consciousness, I find the possibilities of modeling and communicating the nature of various altered states through virtual reality simulations quite exciting. As one example, marijuana intoxication (Tart, 1970; 1971) involves a variety of perceptual shifts in viewing and hearing the external world, changes that experienced users claim are difficult to communicate to those who have not used marijuana. Could experienced users program a virtual reality that would communicate them? Might such a simulation then have an effect of inducing an altered state in some experiencers of the simulation? That would provide interesting data about the induction of altered states in general, an area of great importance in my systems approach (Tart, 1975).

As a second example, an important goal in many meditative training systems (see, for example, Bodian, Kornfield, Vaughan, Ajaya, & Deikman, 1989; Carrington, 1977; Chogyam, 1988; Deikman, 1966; Dhirivamsa, 1984; Goldstein, 1987; Goldstein & Kornfield, 1987; Goleman, 1977; Kornfield & Breiter, 1986; Shapiro & Walsh, 1984; Sole-Leris, 1986; West, 1987; Wilber, Engler & Brown, 1986) is to directly observe the inherent transitoriness of reality. These traditions emphasize that reality is constant process and change, but that the ordinary functioning of our inner world simulation processes (my terms, not the traditional ones) overly concretizes this flow, making it too "thingy" instead of reflecting its process nature. Then we are threatened and disappointed when changes force themselves on us, such that we suppress/repress conscious knowledge of changing reality and/or distort our perception of reality and/or behave maladaptively in our emotional attachment to the "things" we are attached to. A virtual reality could readily be programmed to accentuate change in virtual objects, virtual people and virtual events. Would the experience of such a world, even though artificial, sensitize a person so that they could learn the lesson of recognizing change and becoming less attached to the illusion of permanence more readily in subsequent meditation practice?

The possibilities for studying altered states with virtual reality are many, but space precludes further discussion here.

WE ALREADY LIVE IN VIRTUAL REALITY

As fascinating as the new computer developments in creating virtual reality are, the truth is that *we already live in a*

variety of internally generated virtual realities, whether we label ourselves "clients," "therapists," or whatever. It is happening right this moment. We each live "inside" a world simulation machine. We almost always forget that our "perception" is a simulation, not reality itself, and we almost always forget that we have anything to do with the particulars of how the simulation works. I personally find it exciting that this is just the kind of model of consciousness I proposed in my systems approach for understanding altered states (Tart, 1975), and the technology of virtual reality is an excellent demonstration of that approach.

Let me give you an example of the operation of our personal world simulators, our virtual reality creation mechanisms. In the mid-1960's, a friend, Robert Monroe, and I invented a device for creating a small "psychedelic" light show in people's own living rooms. We put about sixteen Christmas tree light bulbs in the base of a round container. Each bulb was the kind with a thermal breaker built into it, so it blinked on and off, and each colored bulb had a slightly different blink rate. If you looked directly at the bulbs, you saw an uninteresting bunch of blinking bulbs.

We then put a metal plate over the bulbs with a bunch of oddly shaped holes in it, so the bulbs would cast little colored shadows. Then we mounted another plate with oddly shaped holes in it over the first one, and had a motor rotate this second plate very slowly, so the light was coming through combinations of openings that were slowly changing the combined shape. The lights and shadows were then projected on to the inside of a translucent hemisphere. Now you turned on the "Lori Lite," as we called it, and played some music.

I cannot recall how many arguments I got into with people who wanted to know how we were getting the light pattern to synchronize with the music so beautifully. It was perceptually obvious to them that the light patterns and music were synchronized, and so there had to be some highly sophisticated electronic system synchronizing the sound and the light. I would explain that there was no hidden mechanism for synchronization, it was just a bunch of light bulbs blinking in a quite random way, but almost no one would believe me. Finally I would "admit" that, although it was hidden from their sight, there really was a very sophisticated computer synchronizing the light patterns and the music.

This explanation was not really a lie. The "computer" was (and is) located in each viewer's head, and one of its main functions is to "synchronize" events, to "make sense" out of an incredibly complex world. The accepted modern understanding (which I think is actually incomplete in important ways, but that is not germane to our discussion here— see [Tart, 1990a]), starting with a materialistic view of the world, indicates that we do not experience the outer world directly but indirectly. Various physical energies like light and sound are not experienced directly. Rather they cause electrochemical changes in various receptor organs. The nerve impulses generated are then sent onward to the central nervous system, where they are subjected to all sorts of electro-chemical, neurological processing. Given the widely accepted psychoneural identity hypothesis that consciousness is equivalent to and nothing but these electrochemical processes in the nervous system, what we experience is not the world per se but processed neural abstractions. Although these neural events are initially related to external world events, this relationship may be greatly altered by the time we deal with the final neural events comprising consciousness.

That final pattern of neural events that we are conscious of, and the other neural events that lead to it, are our personal World Simulation Process, our mechanism creating the virtual reality in which we experientially live. The structure of our nervous system, as programmed by our personal psychology, constitutes our stereo headphones and "eyephones," our "touchphones," "tastephones," and "smellphones." We sit, as it were, in a movie theatre of our own, lost in the show created by the usually hidden mechanisms of the World Simulation Process.

CONSTRUCTING ORDINARY REALITY: A PARALLEL EXAMPLE

Let us consider in some detail an example of how ordinary perception, which we take for granted, is just as much a semi-arbitrary construction as our computer-generated virtual reality. I will make it closely parallel to our example of computer-generated virtual reality.

I look down at my left hand. I see my "hand," with a small (but immediately worrisome) scratch on the back of it, and see the spaces between the four fingers and the thumb. My hand looks older than I expect. If I wiggle the fingers on my hand I generate kinesthetic sensations and the visual image of my hand wiggles in accordance with my kinesthetic perceptions. If I move my hand and feel it moving, the image of my hand moves appropriately. This perception is instantaneous and whole as far as my consciousness is concerned. It is much like the perception of my hand in our Swim and See World example, except that my perceptions either match my memories and expectations or are within the range of expected variation.

If we analyze what happened in more detail, drawing on both neurological and psychological knowledge, the "instantaneous" and "whole" qualities of my perception break down. I began with an *intention* to look down at *my* hand in order to create an example of the construction of perception, so I start with several biases about what is suitable to perceive, rather than as a neutral observer. I did not notice the table top on which my hand rested, for example, even though it was in my field of view, just as I did not notice the water or the fish in computer-generated virtual reality.

Now the neural mechanisms of perception begin their work, selecting some features and rejecting others. I was not aware of the ultraviolet characteristics of my hand, for example, as the structure of my eyes creates a bias toward the "visible" part of the spectrum of light and away from the ultraviolet. My hand was clearly bounded because the wiring of the visual receptors and further neurological processing emphasize what engineers call "edge detection." Differences in brightness and shading are processed to make the difference even stronger, a form of lateral inhibition (von Bekesy, 1967) that makes edges stand out more than they actually do in the visible spectrum. Such edge detection construction

also makes the fingers immediately stand out, emphasizing the gaps between them, even though closer inspection reveals a relatively gradual shading of light and color intensity between them. Already we have a selective, semi-arbitrary construction, all at a non-conscious neurological level. This parallels the visual presentation of a green, webbed hand with its particular characteristics, selected by operations outside of my consciousness, namely the computer's parameters for Swim and See World.

Note that I did not see a bounded but unknown object with several long appendages at one end that I then hypothesized to be my hand. I instantly saw *my hand*. My visual, tactile, and kinesthetic learnings and conditionings from the time of infancy onward gave this particular perceptual pattern a special meaning, particularly the connotations implied by the semantic label, "hand." Presumably, aspects of this learning were once relatively conscious in infancy when they took place, but the particularistic recognition of and connotations of "hand" now happen automatically and well nigh instantly outside of conscious awareness. In our computer-generated virtual reality example, the perception of the green, webbed hand initially contradicts previous learnings, but this different hand will soon become *my hand* again.

The unexpected visual feature of my hand, the "worrisome" scratch was also instantly perceived and immediately induced a small concern about its potential threat to my health. Upon reflection I can see that if I showed this scratch to a physician she would consider me a hypochondriac to be worried about such an objectively minor scratch, so the particularistic construction of my perception by my World Simulation Process, a heightened concern about my injury, shows here. Similarly, seeing my hand as "older" reveals that my world construction process is comparing it to memory images from a younger period that are linked with some concerns about aging.

Note that I did not go through a conscious process of reasoning about some marks being a scratch and whether that should concern me, or about whether the visual textures I saw could be hypothesized to be the results of aging which reminded me of my concerns about aging, etc. My World Simulation Process instantly and automatically provided me with *worrisome* scratches and an *old* hand. It automatically linked the "oldness" of the hand with our culture's negative attitudes toward age, and the fact that injuries heal more slowly as one gets older. The world simulation of the "worrisome scratch" was not as startling as the eyeball in Swim and See World, but it may link to psychological factors generally affecting the world simulation that are quite important.

This is a great deal of semi-arbitrary construction for a simple act like looking at my hand. How much more is done in the world simulation of complex and emotionally stimulating interpersonal interactions?

BASIC FUNCTION OF THE WORLD SIMULATION PROCESS

In looking at the workings of flight simulators, it is easy to get so fascinated with the cleverness of them that we lose track of the basic function of these simulations of reality, namely to create internalized models of external reality which will help the pilot to survive and function efficiently in external reality, to fly an airplane without crashing. Similarly in examining the way in which our ordinary consciousness is a virtual reality, a world simulation, it is easy to get fascinated with the details and lose sight of the function of the World Simulation Process.

The basic function of the World Simulation Process is to create, maintain, expand and update internalized, rapidly functioning internal models of the real world that will enable us to survive and function efficiently in the real world. As Fodor (Fodor, 1985, p. 4) observes:

> Perception is built to detect what is right here, right now — what is available, for example, for eating or being eaten by. If this is indeed its teleology, then it is understandable that perception should be performed by fast, mandatory, encapsulated ...systems that ...are prepared to trade false positives for high gain. It is, no doubt, important to attend to the eternally beautiful and to believe the eternally true. But it is more important not to be eaten.

When the World Simulation Process gives us virtual realities that differ from the real world in significant ways, we begin to behave maladaptively, creating both real world consequences and/or psychological suffering in ourselves and others. This statement is not as simple as it seems, though, for deciding what is "real" in the world is heavily influenced by the virtual realities already created by our World Simulation Process.

"SIMULATION" OF THE SELF

A vital part of the World Simulation Process is to "simulate" your own self, in both its physical and psychological dimensions. It is not enough to have a representation of the external world, you have to know where you physically are in it, so a body image is simulated as part of the virtual reality we experience. This body image simulation is partly based on external perception of your physical body, as when you look down at it or see your hand in front of you, and partly on kinesthetic and touch sensations. Some of this body image simulation is biologically pre-programmed, as discussed by Neisser (Neisser, 1988) under the concept of the *ecological self*, but much of this process is semi-arbitrary and learned. Clear examples of this are found, for example, in the case of anorexics, who perceive themselves as too fat.

A certain minimal degree of coherence between the simulated body image and external reality is necessary for survival: you have to experience yourself as in the path of that truck roaring down the street in order to be motivated to get out of its way. Beyond that minimal need there is enormous variation, such as are illustrated by differing cultural perceptions of what is "beautiful" about a human body.

I put the word *simulate* in quotes above in discussing the simulation of the self, as we ordinarily have a sense of an internal psychological self beyond its bodily components. The degree of simulation is a tricky concept here. If you feel

"rejected," for example, there may be an immediate, direct psychological reaction of feeling rejected to a concrete action of rejection by another person which has just happened. That feeling is, in a sense, the immediate reality, rather than a simulation of it.

On the other hand, it is highly probable that this feeling initiated by the immediate situation will activate a variety of associated feelings, thoughts, images, and defenses associated with rejection. That is, various earlier world simulations connected with rejection, "who" is being rejected, how you handle such feelings, etc., will be activated and the immediate feeling of rejection may be quickly lost in a greatly elaborated world simulation about rejection. Gurdjieff (Ouspeusky, 1949; Tart, 1986) described this many years ago in stating that actual emotional functioning is fast: your emotional reaction to a situation can come and go in less than a second. The psychological material activated, however, can go on for minutes, hours, days, indeed, for much of your lifetime.

Note that while we ordinarily completely and automatically identify with the self that is produced by the World Simulation Process, we do not have to. One of the things about the powerful experiences produced by the deliberate use of psychedelic drugs that has always puzzled me, for example, is why most people are so *little* changed by them in the long run. Part of the reason is that during the psychedelic experience people may constantly and immediately subrate and so disidentify with their experience, no matter how obviously real, true, and compelling it seems, by telling themselves that what they experience is "just" an effect of the drug. By contrast, people given a psychedelic drug without their knowledge and with no previous experience of such drugs that would allow them to recognize that they are reacting to a drug, can have catastrophic reactions during and after the experience precisely because we ordinarily identify totally with the output of the World Simulation Process. If what you experience is *me* perceiving the real world, and that me and its world starts drastically changing, the only explanation generally provided by our cultural conditioning is that we are going mad. That interpretation, of course, makes things even worse when it is identified with.

There is a great freedom available, a kind of enlightenment, when you realize that the world and self you take for granted because they are an immediate perception are actually, in vitally important ways, an *interpretation*, a simulation, not final reality. Then you can take a simulation as largely a working hypothesis and, when it does not work well, try dropping it and either learn to perceive more accurately, with less distorted simulation and/or create more useful simulations. The techniques for doing this exist in various degrees of development (see, e.g., Goldstein, 1987; Goldstein & Kornfield, 1987; Tart, 1986), but are beyond the scope of this paper.

PERSONALITY, ALTER PERSONALITY, STATE OF CONSCIOUSNESS, CONSTELLATION

Now we shall look at the concepts of *personality*, *alter personality*, and *state of consciousness* and see how the developing area of computer-generated virtual reality casts light on them.

Kluft (1988, p.51) defined personality and alter personality this way:

> I have tended to define a personality, alter, or disaggregate self state in a manner that stresses what such an entity does and how it behaves and functions... A disaggregate self state (i.e., personality) is the mental address of a relatively stable and enduring particular pattern of selective mobilization of mental contents and functions, which may be behaviorally enacted with noteworthy role-taking and role-playing dimensions and sensitive to intrapsychic, interpersonal, and environmental stimuli. It is organized in and associated with a relatively stable... pattern of neurophysiological activation, and has crucial psychodynamic contents. It functions both as a recipient, processor, and storage center for perceptions, experiences, and the processing of such in connection with past events and thoughts, and/or present and anticipated ones as well. It has a sense of its own identity and ideation, and a capacity for initiating thought processes and actions.

Something I find quite interesting about Kluft's definition is that it seems to define a single, presumably unitary personality, the so-called ordinary state of events, as well as an alter personality.

Each of us tends to think of ourselves as *having* a personality (or several of them) and to regard the idea of an altered state of consciousness as something different, something that "happens to" a personality. Actually the concepts of altered state, personality and alter personality are almost identical in most usages. Consider the way I defined a (discrete) state of consciousness in my systems approach to understanding states (Tart, 1975, p.58):

> We can define a d-SoC *for a given individual* as a unique *configuration* or *system* of psychological structures or subsystems. The structures vary in the way they process information, or cope, or affect experiences within varying environments. The structures operative within a d-SoC make up a *system* where the operation of the parts, the psychological structures, interact with each other and stabilize each other's functioning by means of feedback control, so that the *system*, the d-SoC, maintains its overall pattern of functioning in spite of changes in the environment. Thus, the individual parts of the system may vary, but the overall, general configuration of the system remains recognizably the same.

While I emphasized the stability of the pattern and the processes that stabilize it more than Kluft, and he emphasizes potential neurophysiological correlates of the pattern more than I, in both approaches we have:

(a) A pattern/system of psychological/neurophysiological structures that
(b) Persists over a time period, ranging from moments

to years.

(c) Such a pattern/system has a uniqueness, an "identity," a mental address that distinguishes it from other patterns/system.

(d) Such a pattern/system says "I," either in the form of *"I am* this personality" or *"I am in* this state of consciousness." In terms of my systems approach, we would say that the energy and activity of the Sense of Identity subsystem is usually co-opted in an automatic way by the pattern/system that is dominant at a given time. When you have identified, voluntarily or involuntarily, with an ongoing pattern of mental activity, *it is you* for the time being. It does not matter whether we call this pattern a personality, an alter, or an altered state of consciousness.

(e) Such a pattern/system takes in information from both the external and internal (body, feelings, etc.) environments, processes it in terms of the unique characteristics of the particular pattern/system, stores this processed information, makes decisions, and acts on them.

(f) The unique *pattern* of these activities associated with a state of consciousness or with a personality is what makes us distinguish it from other states.

(g) Such a pattern/system frequently tries to stabilize itself, preserve itself, maintain its identity.

I want to emphasize the way such patterns reinforce themselves. Carl Jung introduced a helpful concept many years ago, that of "constellating power." Although he applied it to the emergence of powerful archetypes from the collective unconscious that took over the ordinary self and altered perception, action and feeling to reinforce itself, the process of constellation actually applies to everyday life and perception.

We have all learned to recognize a few constellations in the sky, such as Orion or the Big Dipper, for example. Actually the spatial distribution of visible stars is pretty much random. But can you look at the right place in the night sky and *not* see Orion or the Big Dipper? They leap right out at you. Once a pattern has organized, it is hard not to perceive it that way. A core psychological pattern tends to control other aspects of the world simulation process, automatically organizing the rest of experience around itself in a way that further supports the basic pattern. Once you become quite angry, for example, once anger becomes an altered state of consciousness for you, it is amazing how many irritating things the people around you obviously do and how unsatisfactory and annoying your environment is!

To put it more technically, anger or any other core pattern can become the dominant core of the World Simulation Process. Once that happens the World Simulation Process automatically (mis)interprets your sensory perceptions of your world and yourself in a way consonant with the core pattern. Since the virtual reality created by the World Simulation Process *is* your reality for the time being, it is very difficult not to completely identify with the virtual reality you are experiencing and accept it as "real" reality.

As Neisser (1988, p.53) put it so well:

> My notion of what I am, like your notion of what you are, reflects a cognitive model embedded in a theoretical network. It, too, is based primarily on what I have been told, not only in the form of general cultural assumptions but also of communications addressed to me in particular. Like other concepts it tends to govern what I notice; in this case, what I notice about myself. Like other theories, it is not necessarily correct; all of us know people whose self-theories do work fairly well, at least in areas where they make predictions about real experiences. (Where this is not the case — e.g., in paranoia — we tend to classify them as pathological.)"

DEVIANCY = UNUSUAL WORLD SIMULATION PROCESS

What is a person with multiple personality disorder (MPD) then? Someone who has two or more well developed core patterns, constellation patterns that can take over his or her World Simulation Process such that the person temporarily lives in a virtual reality that constitutes an identity, a personality, a state of consciousness. Remember that experientially this virtual reality is *perfectly real.* Internally generated virtual reality is the only reality we know unless we apply special observational techniques like meditation or psychotherapy, and/or intellectually analyze its nature. If the external physical reality perceived in that altered virtual reality is experienced in a considerably different way from what we so-called "normals" believe it should be, that is not really conceptually strange. Our "normal" perception of physical reality is not a perception of reality *per se* but more a semi-arbitrary construction, a virtual reality, but a particular virtual reality widely shared in its broad outlines by members of our particular culture. Perceiving your own body as female, for instance, if you are biologically male, may require more working over and distorting of sense data than usual, but it is not a fundamentally different process than that which takes place ordinarily.

What is a "normal" person? Someone who *apparently* only has one well developed pattern (ignoring our dream personalities) that can take over his or her World Simulation Process. This is the everyday personality which believes itself to be unitary and which implicitly controls the World Simulation Process during waking hours to produce a virtual reality and consequent actions which fall within the "normal" range. I emphasize apparently above, for we know that there can be considerable degrees of multiplicity within apparently "normal" personality structure.

What is a "neurotic" person? Someone whose World Simulation Process differs significantly from those of "normals," such that areas of life in which "normals" function well become areas of suffering and maladaptive functioning.

What is a "psychotic" person? Someone who lives in a virtual reality so obviously different from the virtual reality range "normals" live in as to be obviously different. These differences may constitute a real threat to themselves or to others within a given cultural matrix and/or may constitute a perceived threat to consensus norms and attitudes, regard-

less of whether they pose actual physical dangers to others.

POTENTIAL APPLICATIONS OF COMPUTER-GENERATED VIRTUAL REALITY TO PSYCHOTHERAPY, WITH SPECIAL REFERENCE TO MPD

Let us consider some of the possibilities of computer-generated virtual reality for psychotherapy. We will be getting quite speculative now, but there are valuable possibilities here. As I have considered them to date, they fall in three broad, but frequently overlapping categories: (a) diagnostic, (b) inductive, and (c) therapeutic/training.

Diagnostic Possibilities

One way to describe mental illness is to say that the world a client (in)voluntarily constructs is not adequately functional, and it certainly is not the same as the typical virtual reality we believe is constructed by "normal" people. Your ability as a therapist to help a client is partly dependent on your ability to understand what the internally generated virtual reality he or she lives in is like. You may get some help from psychodiagnostic tests, but this is inferential knowledge, not direct observation. Your internal simulation of the client's reality (a virtual reality within your ongoing virtual reality) results from a constant interplay between (a) observing the client's behavior and self-reports of experience, (b) hypothesizing (imagining, simulating) what more subtle internal feelings and perceptions might be motivating and affecting the things you observe, and (c) testing these hypotheses to see if they help the client. As individuals, our skill in doing this, whether we do it consciously or more intuitively, varies greatly.

Further, your observations of the client and solicitation of verbal reports of experience is almost always conducted under an extremely limited set of external world circumstances, your office. Yet almost all of a client's problems arise in quite different circumstances: thus your internal simulation of the virtual reality the client lives in is highly inferential and so subject to considerable error. Direct observation would help, but it is not practical to follow the client through his or her daily life.

Eventually, we could have psychodiagnostic tests that involve a client entering standardized varieties of virtual realities, representative of life, and having their reactions measured. There will be office and home scenes, parties and lovers's quarrels, etc. This kind of testing will be far more dynamic than ordinary psychological testing as the way the scenes unfold will be partially controlled by the client's reactions. Various degrees of stress, ambiguity, sensory intensity, interpersonal interaction, etc., can be added as part of the diagnostic series. This will take a long time to develop, of course, but eventually we can get sophisticated reports of a client's reactions to a wide variety of activities of life. These can be "external" reactions, how they act in their virtual body within a certain computer-generated virtual reality, and internal reactions, psychophysiological measures of reactivity to various situations that might reveal hidden dynamics. This would also be an excellent situation in which to study the switch process (see Putnam, 1988) in MPD.

For the therapist who wants more than some other expert's assessment of a client, you could observe your client's reactions in a computer-generated virtual reality much more directly by donning your own EyePhones™, etc., thus seeing the client's experience from a point of view physically similar to theirs. To go even further, you, in the form of your virtual body, could join the client in a shared virtual reality.

Rather than just standardized computer-generated virtual realities, realities tailored to a particular client could be created, to be entered and interacted with by the client and/or you.

Suppose your client has strong paranoid tendencies, for example. We could program a virtual reality to reflect that. Suppose we start with a "normal" simulation of a room with a number of people in it, for example, but then, based on input from the client (either in previous sessions and/or by being in it with us), start modifying it.

We might have the computer darken the shadows in the room, for instance, and have ambiguous motions occur in the shadows. Then we might have the computer modify the facial expressions of the virtual people in the room (including or not including you, the therapist, if your virtual body is present in the scene) to make them look more threatening. Perhaps we could program this computer-generated reality so that no matter which way you turn in it, there is occasionally something moving in the periphery of your vision that you can never get a good look at. Can you now understand your client's reality better?

This potential use for computer-generated virtual reality could be especially important in working with MPD clients since they, in various alters, may live in and interact with a much wider variety of external world situations than ordinary clients.

Inductive Possibilities

Beginning with the early formulations of my systems approach to altered states of consciousness (Tart, 1975), I proposed that we should look at *emotional stress* as discrete altered states of consciousness. Mild emotions need not be considered this way. We can be a little angry or a little jealous, for example, within our ordinary state: almost all of our conscious functioning is within its normal range. Once any emotion crosses some particular threshold, varying across individuals and situations, however, an induction process rapidly occurs which induces a discrete altered state, constellating perception and psychological functioning around the emotion. As we discussed earlier, for instance, when you get angry just about everything irritates and further angers you, not just the specific situation that induced the anger in the first place. You are in an altered state of consciousness. In contemporary psychology and psychiatry, we still do not adequately recognize the many transient altered states triggered by strong emotions.

These emotionally induced altered states are important to the therapist because of the phenomena of *state specificity*. This phenomenon, now widely studied in animals as well as humans (see, e.g., Rossi, 1987), means that certain kinds of

knowledge, *affective* as well as intellectual knowledge, are only available in certain states. A certain life situation, for example, might trigger a particular state or alter personality in a client and a particular problem occurs in that state or alter personality. In the therapist's office, though, as mentioned above, that life situation does not occur, so therapist and client can not effectively get at that problem to work with it.

Hypnosis, widely used in the treatment of MPD, is a way of acquiring relatively direct control over the parameters of the internal World Simulation Process, of course, but space precludes treatment of this important topic here.

Thus computer-generated virtual realities have important potential applications as induction techniques. Putting a client in a tailored virtual reality that induces the rages or depressions or fits of jealousy that create his or her life problems could have great diagnostic value. With MPD, it might be possible to quickly bring out alters that might be difficult to reach in the therapist's office. This could be both dangerous and ethically questionable, of course, so this possibility (indeed, all of the possibilities discussed in this paper) would have to be developed with great sensitivity and care.

There are also interesting possibilities here of creating historical situations that were central in the creation of a client's problem here. It will soon be technically possible, for instance, to have the computer generating virtual reality scan photographs of a client's parents and create virtual people who look like those parents. Although I do not know of work on it, I believe computers could alter voices to make them sound like specified people also.

Therapeutic/Training Possibilities

This leads us to the third major class of potential applications, carrying out psychotherapy and/or training more adaptive ways of handling various situations in computer-generated virtual reality. If your client is plagued by feelings of rejection at the office, for example, that is the best place to work with him or her. It is not practical to follow your client around in his or her ordinary job. But you could join your client in a virtual reality office tailored to closely resemble the one that he or she actually works at, and the virtual co-workers could engage in actions that could be interpreted as rejection. Can you and your client do psychotherapy there, where, in a sense, the problem really lies? How much more effective might this be?

For MPD clients, you could travel through various virtual reality situations with different alters, doing psychotherapy and training with them individually as groundwork for eventual integration. This could include virtual realities that closely resemble historical situations in which a particular alter was created, such as a childhood abuse situation. I personally find this idea somewhat morally repulsive, but skillfully and sensitively used it could be of great therapeutic value.

Insight is wonderful, but not always enough. You could train and coach the client in the virtual office to react more adaptively, remind them of previous insights and resolutions right in the situation that is the problem, and have her practice alternative responses. I predict that this has great possibilities for making therapy more effective.

QUESTIONS, POSSIBILITIES

Wilson (Wilson, 1989, p.18) has neatly summarized the modern view that the nervous system creates a virtual reality for us:

> Anthropology, perception, psychology, neurology, phenomenological sociology, ethnomethodology, and even ethology (in its study of imprinting in animals), all confirm the quantum mechanical and existential view that the world we perceive is a Mickey Mouse cartoon our brains have created out of signals that arrive as raw energy at the rate of millions of bleeps per second. Which type of Mickey Mouse cartoon — or Homeric epic or soap opera — we make of these signals depends on our genes (which species of brain we have — mammalian, serpentine, insectoid, etc.), and next on our imprints, and our conditioning and 'learning' or brainwashing by society, and these are perpetuated by our lazy habits and only sometimes modified or somewhat transcended by our efforts at creativity and higher awareness.

The disadvantages of existentially existing in our own virtual realities are obvious when they involve people who are clearly deviant or suffering, but they also exist for ordinary people. Too many of us are living much of our lives in Mickey Mouse cartoons or Homeric epics or soap operas. The incredible capacity of the World Simulation Process to create a reality instantly is both a blessing and a curse. It is a blessing in that it is a widely extended and creative form of what Piaget (Piaget, 1926) termed *operational thinking*, an essential aspect of higher intelligence, the ability to imagine, "What would happen if..." without putting your physical body on the line. It is a curse in being so powerful and addictive, allowing us to tune out actual reality all too effectively.

This application of my systems theory approach to states of consciousness and the technology of computer-generated virtual reality is still in its infancy, so the primary purpose of this paper is to stimulate rather than to "explain" in any kind of final sense. Many basic questions need extensive research. I shall mention just a few.

> What are the limits of arbitrariness of construction of our internally generated virtual realities that are compatible with survival? That is, how idiosyncratic and different from social and physical reality can an individual's world simulation be without death or serious malfunctioning? This can be asked both on fundamental neurological levels and psychological and social levels.

Given that the world simulation we live in is part of a dynamic system, obeying the general laws of systems theory and of psychodynamics, other fundamental questions arise about individuals. For example:

What stabilizes and reinforces particular patterns (states, alters, main personality)? What are the induction processes that induce a change from one particular pattern to another? For MPD, the switch process (Putnam, 1988) is such an induction process.

I have elaborated on stabilization and induction mechanisms in general in the systems approach (Tart, 1975), but much more detailed investigation is needed.

These areas of altered states, altered personality and world simulation are exciting, and I hope these ideas will stimulate you! ■

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