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INVITED ESSAY

The "Genius Hypothesis": Exploratory Concepts for a Scientific Understanding of Unusual Creativity

ERVIN LASZLO

The General Evolution Research Group, 56040 Montescudaio, (Tuscany) Italy

Abstract

Unusual acts of artistic and scientific creativity — associated in the popular mind with the concept of "genius" — do not have a satisfactory explanation in terms of the cerebral or mental processes of individuals. The 'genius hypothesis' suggests that such acts of creativity involve an interaction between the mind of the creative individual and other minds, bent on similar creative endeavors. The interaction envisaged in the hypothesis relies on the spontaneous transmission of the crucial *Einfall* that catalyzes the creative acts. Following the presentation of pertinent evidence culled from the fields of cultural development, scientific discovery and artistic production, the mechanism of transference is illustrated with the analogy of networked computers. It is also shown to shed light on what Jung called 'archetypal experience.' The phenomenon of instantaneous spatiotemporal connectivity is not limited to human brain-minds but has counterparts in quantum physics and evolutionary biology. Its explanation poses one of the greatest challenges to the contemporary natural sciences.

Introduction

Do unusual acts of creativity occur in the isolation of a closed-system brain, or is that brain — and the correlated mind and consciousness — effectively interacting with other brain-minds in the creative process?

Social and cultural influences on the minds of creative people are undisputed — no person is a Robinson Crusoe, least of all sensitive individuals such as artists, writers, composers and others of their kind. The question raised here concerns a more immediate and spontaneous interaction than the standardly envisaged sociocultural influences: it concerns the possibility that the minds of unusually creative people are in spontaneous, direct, though usually not conscious, interaction with other minds *in the creative process itself*

Subtle interactions beyond the scope of sensory perception have been suggested for millennia: they are an essential part of both Eastern and Western

traditional metaphysics and mysticism. In modern times many forms of ESP have been investigated in the laboratory, producing statistically significant results. "Twin pain" and image transference between emotively closely linked individuals even when physically distant is relatively well established. The transactional and transpersonal schools of psychology acknowledge the reality of spontaneous subtle interactions between the emotive and cognitive processes of individuals. Although there is as yet no definitive explanation of the way ideas or images are transferred without sensory contact, there can be little doubt that such transfers do take place.

A process that is basically the same could underlie unusual acts of creativity as well. The creative product could be the result of an interaction, rather than the fully autonomous output of one individual. It may be that unusual, quasi-miraculous forms of creativity need to be traced to a confluence of interconnected creative processes, rather than to one self-contained individual. The "genius hypothesis" of interactive creativity could bring the astounding phenomena of genius closer to scientific understanding.

This paper will first review the main strands of evidence relevant to the thesis of interactive creativity, and then sketch a conceptual framework capable of providing a researchable and potentially fruitful explanation of the observed facts.

The Principal Strands of Evidence

Cultural creativity — the collective advance of entire populations through the typical creative activity of their members — is one strand of evidence relevant to interactive creativity. In the cultural creativity of a population not only members of the same population seem to interact (that would be explicable by information transfer through standard means), but also members of distant populations appear to be in some form of contact. It appears to be a fact that parallel cultural achievements have occurred among populations that are unlikely to have been in any standard form of communication with one another. The control of fire was an invention that occurred in distant populations more or less at the same time. *Homo Erectus* tended fires in various locations: at Zhoukoudien near Beijing, at Aragon in the south of France, and at Vértesszöllös in Hungary. These far-flung populations could not even have known of each other's existence, yet they appear to have evolved the art of igniting, tending and transporting fires almost simultaneously. Early cultures also developed tools of striking similarity. The Acheulian hand axe, for example, was a widespread tool of the Stone Age, and it had a typical almond or tear-shaped design carefully chipped into symmetry on both sides. In Europe the axe was made of flint, in the Middle East of chert, and in Africa of quartzite, shale, or diabase. Its basic form was functional, yet the agreement in the details of its execution in virtually all known cultures cannot be readily explained by the coincidental discovery of utilitarian solutions to shared needs — trial and error is unlikely to have produced such similarity in these distant populations.

Other artifacts, too, seem to have leapt across space and time. Giant pyramids were built in ancient Egypt as well as in pre-Columbian America with remarkable agreement in design. Crafts, such as pottery-making, took much the same form in all cultures. Even the technique of making fire brought forth implements of the same basic design in different parts of the world. Although each culture added its own embellishments, Aztecs and Etruscans, Zulus and Malays, classical Indians and ancient Chinese, all fashioned their tools and built their monuments as if following a common basic pattern or "archetype."

Entire cultures have come to flower at the same time, entirely, or almost entirely, independently of each other. The great breakthroughs of classical Hebrew, Greek, Chinese and Indian culture occurred in widely scattered regions, yet they occurred practically simultaneously. The major Hebrew prophets flourished in Palestine between 750 and 500 BC; in India the early Upanishads were composed between 660 and 550 BC; Siddharta the Buddha lived from 563 to 487 BC; Confucius taught in China around 551 to 479 BC; and Socrates lived in Hellenic Greece from 469 to 399 BC. Just when the Hellenic philosophers were creating the basis of Western civilization in Platonic and Aristotelian philosophy, the Chinese philosophers were founding the ideational basis of Oriental civilization in the Confucian, Taoist and Legalist doctrines. At the same time that in the Hellas of the post-Peloponnesian wars period Plato founded his Academy and Aristotle his Lyceum, and scores of itinerant sophists preached to and advised kings, tyrants and citizens, in China the similarly restless and inventive "Shih" founded schools, lectured to rulers, established doctrines and maneuvered among the scheming princes of the late Warring States Period.

"Synchronicities" such as these are not restricted to classical societies; they have occurred even in modern science. There are documented cases of insight coming practically simultaneously to different investigators who were not aware of each other's work. The most celebrated of these cases concerns the simultaneous and independent discovery of the calculus by Newton and by Leibniz, the likewise simultaneous and independent elaboration of the fundamental mechanisms of biological evolution by Darwin and by Wallace, and the concurrent invention of the telephone by Bell and by Grey.

Insight and discovery could also leap across different branches of the same culture. While Newton was using a prism to break down the shafts of light that entered the windows of his Cambridge lodgings, Vermeer and other Flemish artists were exploring the nature of light entering through colored door-and window-panes. While Maxwell was formulating his electromagnetic theory, according to which light is produced by the reciprocal orthogonal revolution of electrical and magnetic vectors, Turner was painting light as swirling vortices. In recent years physicists have been exploring many-dimensional spaces in grand unified theories, and simultaneously, and apparently entirely independently, avant-garde artists experiment with visual superposition on their canvases, representing spaces of as many as seven dimensions.

Space and time, light and gravity, mass and energy have all been explored by physicists and by artists sometimes at the same time, sometimes one preceding the other, but seldom if ever in conscious knowledge of each other. Shlain (1991) explored these "coincidences" in detail and provided stunning illustrations of the power of artists to mirror, and frequently to anticipate, the conceptual breakthroughs occurring in the minds of physicists without knowing anything about physics and the concerns of its investigators.

Researchers of synchronicity have found many instances of such "coincidences" (Jung, 1973; Peat, 1987; Combs and Holland, 1990). Some are easy to dismiss as illusory, others may be due to chance, but many defy conventional explanation. The phenomenon itself has merited the attention of some outstanding thinkers. Hegel formulated his celebrated concept of Zeitgeist, the spirit of an age that infuses the minds of its contemporaries, and Jung advanced the concept of the collective unconscious, the sharing of mythic symbols and archetypes in diverse cultures.

Phenomena of cultural synchronicity may indicate interaction between individuals that transcends the known bounds of sensory perception with its limitations of space and time. It is conceivable that some individual acts of creativity would be influenced by such interaction: that some insights would not be due to a spontaneous and largely unexplained stroke of genius but to the elaboration of an idea or a pattern in two or more minds in interaction. This would be equivalent to a dialogue in the Platonic sense of the term, where it stands for a process of which the results transcend the abilities of the dialogue partners individually. It recalls Plato's view that the soul "recollects" the key ideas in the course of an insightful dialogue. We would only need to substitute "collection" for "recollection": according to the thesis of interactive creativity, in the course of the creative process persons collect (from other creative persons) some element of their creativity.

Independent evidence suggests that genuine acts of creativity are often based on what the Germans call an Einfall (meaning a sudden and spontaneous intuition leading to a conceptual or esthetic breakthrough). Individuals of genius, known for repeated Einfalle, are regarded as having been born with rare and mysterious gifts: a Mozart, a Michaelangelo, or a Shakespeare, to name but a few. This view is reinforced by the fact that otherwise unremarkable individuals can display astonishing capabilities in specific fields, most often in music and mathematics. To call such individuals "gifted" and their achievement "works of genius" is not to explain their abilities, but just to label them. How did they come by their unusual accomplishments? Are they the possessors of a fortunate combination of genetic information? Or did they receive their gifts from a higher force?

Better explanation than these are possible. We should note first of all that some of the most remarkable *Einfälle* occur in altered states of consciousness. Few artists compose music and poetry or paint and sculpt in an ordinary commonsense frame of mind. There is almost always some element of transport to

another plane of consciousness, a deep concentration that approaches a state of trance. In some (relatively rare) cases these "inspired states" are artificially induced — by drugs, music, self-hypnosis or other means. Mostly, however, they come spontaneously to the gifted individual. Coleridge composed his celebrated epic poem *Kubla Khan* while lying in what he described as a profound sleep (which was in fact induced by laudanum, an opium-based substance he took as medicine); Milton created his *Paradise Lost* as an "unpremeditated song" dictated, he said, by the Muse. Mozart claimed that his compositions came to him during nights when he could not sleep. They came completely, from where he could not fathom. He did not hear the parts one after the other, but the whole piece at once. "What a delight this is, I cannot tell." he wrote, "All this inventing, this producing, takes place in a pleasing lively dream." (Owen, 1988).

In the sciences too, altered states are frequent in processes of innovation and discovery. Though scientific discoveries are paradigms of reason and logic, many of them owe their existence to an unusual state of consciousness in their authors. This is true of mathematical discoveries as well. Evariste Galois, for example, committed to paper his fundamental contributions to higher algebra at the age of twenty, in three feverish days before meeting an adversary in a duel that he expected — correctly, as it turned out — to be fatal. Karl Friedrich Gauss sought to discover the proof for the way every number can be represented as the product of primes and, though he made many tries, did not succeed for years. After many failures he could write in his diary that he had succeeded, "but not on account of my painful efforts. Like a sudden flash of lightning, the riddle happened to be solved." Henri Poincaré said with good reason that the elements of mathematical discovery are "harmoniously disposed so that the mind without effort can embrace their totality — divining hidden harmonies and relations."

Exceptional achievements can be given rational explanation: we can follow up the lead of unusual creativity in altered states. Consider, then, the paradigmatic creative act. A person with a high level of motivation and great powers of concentration focuses on a given task or problem. Another person, likewise highly motivated and concentrated, focuses on the same or a closely similar task. In these conditions the similarity of the states of the brain in these individuals allows some level of access to each other's emotive or cognitive processes. This permits a subtle dialogue that can have remarkably creative consequences.

The above is more than simple conjecture: significant evidence is now available in support of spontaneous brain-to-brain interactions. Experiments in Italy with the so-called "brain holo-tester" (a computerized electroencephalograph [EEG] device capable of continuously measuring the level of synchronization between the left and right cerebral hemispheres) show that in deep meditation the synchronization of the two hemispheres increases dramatically. More than that, experiments with ***two*** test subjects measured simul-

taneously indicate that in deeply meditative states the subjects brain waves become doubly synchronized: left-right as well as person-person. Since person-person synchronization occurs in the absence of sensory communication, it furnishes evidence that in altered states persons who meditate together influence each other's cerebral processes. Indeed, the transference of images and fantasies among meditating persons is a frequent occurrence. On occasion, the meditators are capable of interacting with each other's fantasies. Space and time seem to make little difference in these phenomena.

A related phenomenon came to light in recent investigation of so-called telesomatic effects. Here one person creates effects on another's body similar to the effects one's own mind would create. Traditionally, telesomatic effects were produced by specially gifted natural healers, who would "send" what they claimed to be subtle forms of energy to their patients. (The negative variety of telesomatic events came under the heading of voodoo or black magic; they were common in the practice of shamans and witch doctors. See e.g. Dossey [1994].) Being largely anecdotal, telesomatic events were of interest mainly to anthropologists; they were dismissed by the scientific and medical community. Now, however, such events have been investigated in controlled experiments, where either a sufficient number of trials or a sufficient number of test subjects permit a quantitative evaluation of the results. For example, William Braud and Marilyn Schlitz of the Mind Science Foundation in San Antonio, Texas, carried out hundreds of trials with rigorous controls regarding the impact of mental imagery of "senders" on the physiology of "receivers." The latter were both distant, and unaware that such imagery was being directed to them. They claim to have established that the mental images of a person can "reach out" over space and cause changes in the physiology of a distant person–effects comparable to those one's own mental processes cause in one's own body (Dossey, 1993).

Another variety of telesomatic experiment makes use of intercessory prayer to achieve telesomatic effects. Following the pioneering experiment of cardiologist Randolph Byrd with groups of patients at the coronary care unit of San Francisco General Hospital, numerous experiments have been made with the healing effect of prayer. Daniel Benor of the Doctor-Healer Network in England undertook a detailed study of 131 such experiments and found that 56 of the experiments had a probability value of less than .01, and a further 21 had probability values of between .02 and .05. Benor also found that of the 155 controlled studies of healing published until 1993 — involving subjects as varied as enzymes, yeasts, bacteria, red and white blood cells, cancer cells, plants and mice, as well as humans — 67 (or 43 percent) have had probability values of less than .01, and another 23 (15 percent) probability values in the range of .02 to .05, (Benor, 1993). Such results cannot be due to simple serendipity.

Telesomatic effects triggered by intense meditation — a state of mind not unlike that of deep prayer — have been known in the East for centuries. Cur-

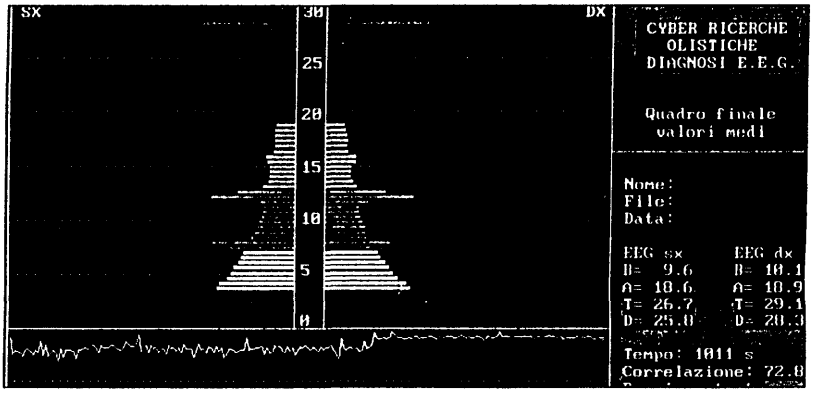

Fig. 1A EEG waves of the left and right hemispheres in light meditation (correlation: 65.3%)

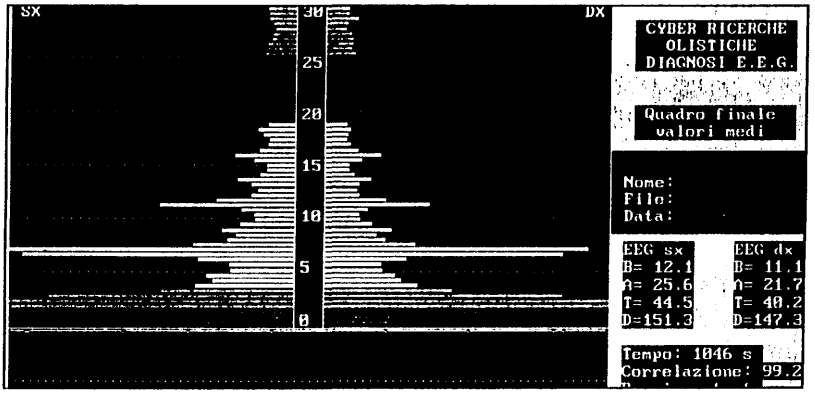

Fig. 1B EEG waves of the left and right hemispheres in deep meditation (correlation: 99.2%)

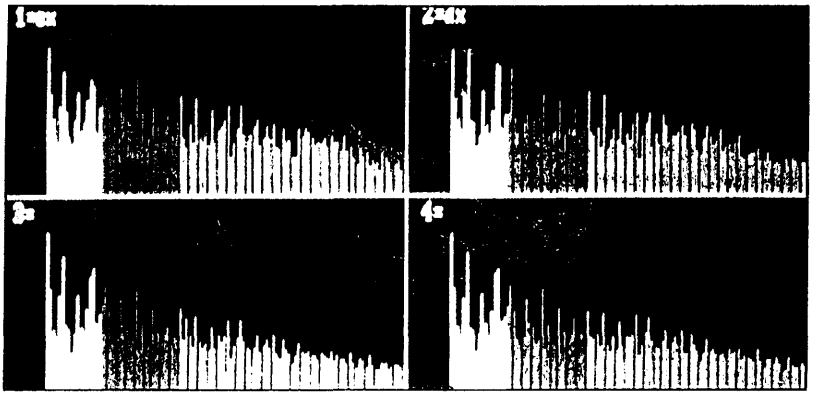

Fig. 1C EEG waves of the left and right hemispheres of a woman (top) and a man (bottom) in deep meditation. The four patterns are quasi-identical. From *Cyber*, Milan, No. 40, November, 1992.

rent studies demonstrate that such effects may be real beyond reasonable doubt. However, the evidence does not establish that the effects are due to the direct action of the mind of some individuals on the body of others. Rather, the process seems mediated (and perhaps entirely effected) by the mind of the receivers themselves. A survey of psychic healing experiments by S. A. Schouten showed that there is little evidence that "the effect of the method" would be responsible for the observed healing. Rather, the positive effects appear to be achieved by what Schouten terms "psychological factors associated with patients and healers" (Schouten, 1993).

Assuming that not all cases of psychic healing are cases where patients cure themselves (perhaps under the impression that they are being cured by healers), the residual healing effect must be due to the influence of the healer on the patient. Though this influence does not appear to be exercised directly on the body of the patient — the "effect of the method," as Schouten claims, being weak or non-existent — it could be exercised indirectly, via the mind of the patient. Doing so even from a distance would be consistent with highly tested remote viewing and thought — and image-transference experiments, where mind/mind, rather than mind/body effects are noted. Also distance diagnosis would come into this category, if it occurs by the diagnostician accessing subconscious processes in the mind of the patient. (This is a reasonable conjecture: the experience of many psychotherapists shows that most patients "know" on some subconscious level what is wrong with their bodies. Dr. Thomas Steinmann of Vienna, for example, a qualified alternative medicine practitioner personally known to the author, has achieved a high success rate in his diagnoses by placing patients in a relaxed, meditative state and listening to what Steinmann calls the 'inner doctor" [*innere Arzt]* has to say in the responses of his patients.) If so, telesomatic effects would reduce to psychosomatic effects conveyed telepathically from healer to patient. This would require a finely tuned relationship between healer and patient — something that, Schouten himself notes, is consciously striven for by most healers and many patients. When such a rapport is established, it usually involves somewhat altered states of consciousness, dominated by concentration on "sending" on the part of the healer and the expectation of "receiving" on that of the patient. The altered state of the rapport could create the necessary framework for the spontaneous transmission of the will or motivation for healing from healer to patient.

Schouten's conclusion that "the concept of the paranormal cannot really provide an explanation for psychic healing" may be unduly skeptical (Schouten, 1993). The evidence for a spontaneous transmission of effects between the mind of different individuals, and between the mind of one individual and the body of another, is significant, and it shows that separate and possibly distant individuals can affect each other even in the absence of sensory communication. The synchronization of EEG patterns in non-communicating test-subjects speak to this point.

The same basic kind of mind/mind communication with correlated brain/brain synchronization could underlie acts of unusual creativity as well. As different persons bent on a related creative task enter a state of deep concentration, their brain states are likely to become highly synchronized whether or not they are physically in the same location, and whether or not they even know of each other. These finely tuned cerebral processes could permit some level and form of interaction. The latter could occur in the absence of any conscious awareness of it. In fact, the absence of conscious awareness is likely to facilitate the interaction. Normal waking consciousness is known to suppress unusual contents of consciousness: It is dominated by the linear logic of the left cerebral hemisphere. The altered state of intense concentration (or meditation) is relatively free of such constraints. It can allow subtle inputs — Einfalle — to fertilize and inspire one's creative endeavors.

The Functional Analogy of Networked Computers

The above variety of processes, required in a coherent explanation of acts of unusual creativity, can be illustrated with the functioning of networked computers.

In modern business and professional computing systems, information from local and distant sources can be combined and subjected to programmed processing. Doing so furnishes a functional analogy for the kind of local/long-distance information processing through which the creative individual may receive the crucial Einfall. He or she may receive a sudden flash of insight, sufficient to start off the process of creative elaboration, or he or she may be guided by a sustained though subconscious "dialogue" during which now this avenue, now that, is explored, assisted by flashes of intuition. This kind of process occurs frequently in scientific explorations: the author himself has been fortunate to experience it on a few occasions. Its analogy is access to data downloaded from another source, and their elaboration with the help of data inputted in one's own system.

In interactive creativity the brain/mind processes of many individuals may be involved simultaneously. This, in turn, has a functional analogy in widely networked computers. In electronic bulletin boards programs are created that allow subscribers to both read their own materials into the board, and to read out from the board what other subscribers have inputted. Items can be elaborated by many subscribers together, and others who read out the results have no knowledge as to which part has been contributed by which subscriber. This illustrates the kind of process that obtains when not a specific concept or notion "falls in" (becomes the Einfall) but a residue or amalgam resulting from the creative processes of many individuals. At the most fundamental level, the composite Einfall amounts to Carl Jung's "archetypal experience." Here the collective unconscious (said by Jung [1962] to be "the psychic expression of

the identity of brain structure irrespective of all racial differences") functions as a species-wide bulletin board.

The analogy of networked computers cannot be stretched beyond its capacities: it remains an analogy. In the real world, not switched connections and electronic bulletin boards, but natural factors would have to ensure the synchronization of cerebral processes, and the observed spontaneous interpersonal communication events.

Interpretation

Spontaneous interconnection among spatially separated phenomena are known to occur in a variety of fields of investigation. In quantum physics, for example, in the EPR and related experiments, particles exhibit "non-locality": one particle interacts with an identical particle across space and time. In the double slit experiment, particles interfere with successively emitted particles as if they were waves — and as if they were still present. In accordance with Pauli's principle (which requires specific correlations between electrons in the shells surrounding atomic nuclei without dynamic forces acting between them), particles are immediately and non-dynamically "informed" of each other's quantum state in the structure of atoms.

Analogous interconnections exist in the living world. The genotype is not as fully isolated from the environment that surrounds the phenotype than as classically believed. Genetic mutations seem complexly adapted to the milieu of the species; isolated chance mutations could not account for the massively coordinated systemic changes that are required if the genome is to produce a viable new species. And, as shown by statistically significant findings in controlled experiments in remote viewing and other forms of thought and image transfer, in the sphere of mind and consciousness information seems to be transmittable beyond the range of sensory perception. Such findings indicate that phenomena in the natural world are more intimately linked than mainstream science has, as yet, allowed. A connecting factor is present in many domains of investigation, including the physical, the biological and the psychological (Laszlo, 1993).

Spontaneous interconnections among human brain-minds are instances of the close connections that link phenomena in many domains of investigation. The presence of such interconnections in humans means that individuals are not isolated information-processing systems. They are open to the world not only through the bodily sense organs, but through distance information processing capacities in their brain. This notion is part of the great esoteric traditions of both East and West. It is also a cornerstone of the intellectual current Aldous Huxley named the perennial philosophy. The analogous insight crops up in modern psychology and psychotherapy. The thought expressed by Carl Jung in one of his last letters is illuminating. "We may have to give up thinking in terms of space and time when we deal with the reality of archetypes," he wrote in 1961, "It could be that the psyche is an unextended intensity, not a

body moving in time. . . . in itself, the psyche would have no dimension in space and time at all" (Jung, 1961).

The investigation of the physics that underlies spontaneous communication among spatiotemporally distant human beings, and analogous processes in organisms and in quanta, is one of the greatest challenges awaiting the contemporary natural sciences. Its sustained pursuit would link the timeless intuitions of mysticism and perennial philosophy with empirically researched and scientifically understood phenomena. It could also lead to a better understanding of the nature of unusual acts of creativity, resulting in an explanation that does not call for ascribing the faculties of genius either to gifts or to genes.

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