

# *Creationism in Music Education: The legacy of Lerdahl and Jackendorff*

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A review of *Musical Creativity: Multidisciplinary Research in Theory and Practice* ed. Irène Deliège and Geraint A. Wiggins. Hove and New York: Psychology Press, 2006.

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This collection of papers addressing musical creativity from a variety of disciplines constitutes the formal publication of a conference held at the University of Liège in 2002 in celebration of the 10th anniversary of the founding of ESCOM, the European Society for the Cognitive Sciences of Music. In their preface the editors identify creativity as “one of the most difficult issues facing scientific psychology,” claim that its study is “relatively rare in the cognitive sciences, especially in artificial intelligence,” and declare the aim of the present anthology “to help initiate a research dynamic” in the subject. These tentative, even overstated objectives arise in part from the nature of the discipline and more particularly as positions defended in the papers themselves and the methodologies they represent. It is my intention in this review to acknowledge the importance of research into creativity while reserving judgement on ownership of the topic and the relative success of different approaches.

We may start by critiquing declarations of fact that are in reality doctrinal positions. The first is the position that musical creativity can be studied without reference to actual works of music. Opening and closing contributions to the present anthology by Nicholas Cook and Jonathan Harvey respectively may be intended to suggest otherwise until one actually reads them. A second and more sinister reason is the profession’s ideological exclusion of twentieth-century music and composers from consideration, a major reason why, fifty years down the track, basic issues are still being tinkered with, fundamental attitudes have not shifted, definitions of creativity and music are still being debated, and solutions applying to music as it is actually practised have yet to be discovered.

A third is the claim that psychologists were not interested in creativity prior to the 1950 APA presidential address by J. P. Guilford. This may be true of some branches of psychology but is a thousand years late in respect of scholarly attention to codifying voice inflection as the expression of individual personality or authorized meaning. Standard (instrumentally non-specific) notation is a development unique to Western Europe that while driven by a desire for the accurate preservation and reproduction of speech inflection, and thus the meaning of texts of high cultural significance, also provided a procedural model for plotting dynamic processes in any field of study, from Kepler’s notation of the motion of the planets (1) to the movement of share prices. The original function of medieval notation as a guide to inflection survives as present-day punctuation marks.(2)

The date 1950 does however coincide with the onset of a period of greatly increased

US investment in language codes and related fields including software design, speech recognition, electronic music, voice analysis (vocoder), probabilistic compositional theory (Hiller and Isaacson), generative grammar (Chomsky and others), and artificial intelligence. The sudden burst of interest in a mechanistic definition of creativity is due less to the spontaneous initiative of one farsighted individual than to a sudden and irresistible influx of research funding targeting a small but essential part of a cross-disciplinary research strategy generated by cold war imperatives and aimed at developing speech recognition and detection protocols with useful counter-intelligence applications.

Of necessity Guilford's "creativity" initiative along with the categories devised to isolate it tended to emphasize criteria for the continuous passive monitoring and detection of language and keyword combinations classified as deviations from standard norms of legitimate discourse. The visibly McCarthyite tendency to conflate creative or new intelligence with hostile intention is not just a remnant of wartime code-breaking and cold war culture but also a residue of educational theory dating back to the era of J. J. Rousseau, before the French revolution of 1792, when teaching music in school was sanctioned as a means of civilizing the young and suppressing latent antisocial tendencies among the lower orders—an attitude that survives to this day. The same bias has inevitably contaminated definitions of creativity elsewhere, in education and music therapy to especially disastrous effect.

The alternative "evolutionary" hypothesis of creativity is equally fanciful but at least has the merit of redirecting attention toward the romantic origins of creativity discourse in nineteenth-century science. According to the evolutionary paradigm creativity is both a distinguishing feature of artistic genius and a manifestation of adaptation to global change in the cultural environment (in this case arising from the overthrow of the classical social order). The significant ideological subtext of the psychological agenda toward the creative arts has to do with control by the state of individual freedom of expression; a tendency plainly visible in the explicitly antimodernist dogmas of Schenker, Adorno, Meyer, and others, and reflected in the fastidious evasion of real music, and legislative tone, of many contributions to the present collection.

Fear of new ideas, of change and continuity as necessary features of human life, is only one aspect of a wideranging and essentially middle-class anxiety toward disease, the emotions, and irrational impulses, including the creative arts. We note the residue of such superstitions in a number of papers in which creativity is linked to mental disorder or antisocial attitudes. The equivalent prejudice (that language (*la langue*) is static and lawful whereas ordinary speech (*la parole*) is dynamic and unlawful) is firmly embedded in de Saussure's theory of linguistics and its literary aftermath, the "newspeak" of George Orwell's novel *1984*. It finds expression in a general reluctance within the discipline to engage with genuine art or contemporary trends in music over the past century. This is particularly surprising given the direct relevance to creativity research of contemporary developments in music around 1950, in works by Cage, Feldman, Messiaen, Boulez, Stockhausen, and others.

In music philosophy the British tend to acknowledge the lead of their continental counterparts, finding explication more to their taste than intellectual creativity. Reading Nicholas Cook's introduction, entitled "Playing God: Creativity, analysis, and aesthetic

inclusion,” I am reminded of Dr. William Pole’s remarks on the late Moritz Hauptmann, author of the first serious attempt to establish a philosophical theory of music: “It was a work involving great thought; but unfortunately, the author, who had deeply studied German philosophy, built his theory on transcendental metaphysics, borrowed chiefly from the system of Hegel.” (3) Pole preferred Helmholtz’s *On the Sensations of Tone*, noting however that “the musical part of Helmholtz’s work is very difficult. His researches embrace topics which are, generally speaking, abstruse and unfamiliar, [requiring] not only much industry and perseverance, but a somewhat rare combination of high scientific and technical knowledge.” The same cultural inclination to manage other people’s ideas rather than learn or invent them oneself is no doubt the reason why English musical scholarship in this area has produced nobody to equal the depth and originality of Helmholtz’s original study, while at the same time enabling the standard English language edition of Helmholtz to be amplified by some 136 double column pages of 6pt annotation by translator Alexander J. Ellis (4).

The comparison is pertinent because Nicholas Cook, as spokesperson for music analysis (or heir to the more recent and relevant scholarship of homonym Deryck Cooke), might have been expected to endorse the research efforts of his ESCOM associate contributors. He does nothing of the kind. Dr Cook’s prose is vacuous and inebriated. He is temperamentally inclined to the mystical exegeses of Schenker, Hans Keller, and Adorno, not because they are interesting or insightful, but because such writing is both ubiquitous and “spiritual”: a common discourse the author has the cheek to pretend “is pervaded by the language of compositional creation.” Toward his more scientifically inclined colleagues he affects a patrician and withering contempt. “The increasingly professionalized theory of the second half of the twentieth century may look like a theory of music, but is largely a theory of musical creation in drag.” The author is no less embarrassing about the language of winetasting, about which he has an undue amount to say.

Björn H. Merker’s “Layered constraints on the multiple creativities of music” makes better sense. What is creativity if it does not result in a better piece of music? he asks, adding “Musical creativity cannot be equated with the production of novelty any more than it can dispense with it altogether.” This is the classic hamburger marketing paradox, a reminder of David Ogilvy’s remark on creativity, cited by McLuhan, that the issue in good advertising “is not how to attract the viewer. The viewer is already watching. The problem is how to make him not switch off.”

It is symptomatic that creativity in musical performance should be discussed in this context and elsewhere almost exclusively in instrumental terms. Vocal music, voice expression, word-setting, and the expressive tension that obtains between melody, pronunciation, and inflection are major influences on the acquisition and management of expressive gestures in instrumental music, a recent indication being Kathryn Puffett’s interesting paper on the relation of instrumental motifs and notated speech inflections in Schoenberg’s *Pierrot Lunaire*. (5) “Music is music by virtue of the discretising constraints that provide it with limitless scope for creating novelty by self-diversification through the operation of the particulate principle.” It is all the same an approach strikingly aligned to serialism of the *die Reihe* era, though one that has failed to generate creative musical results of the cultural value or interest (say) of Messiaen’s *Mode de valeurs*, Boulez’s *Structures 1a*, or Stockhausen’s *Klavierstück III*.

Merker's doctrinaire exclusion of continuity dynamics in speech to focus on the arbitrary sequencing of unit phonemes or tones as sense-data follows a tradition of Saussurian linguistics ideologically opposed to the arguably more relevant studies of speech formation, such as Harold Stetson's in motor phonetics (6), and vocoder "visible speech" voice analysis, by Potter, Kopp and Kopp (7), that address acoustic performance as a physical process, and have led to demonstrably practical results in music and speech synthesiser design. The author is all the same right to conclude, however awkwardly, that "this same finitude of elements [is essential] for the discriminability, learnability, memorability and reproducibility of music patterns."

The original criterion for machine intelligence in the 1950s (8), and computer composition immediately thereafter (9), was that the machine produce sentences indistinguishable in essential respects from those of a human being. To date, Boulez's *Répons* (1983–85) is the most accomplished example of music incorporating the appearance of spontaneous dialogue between live performers and computer. Mark M. Reybrouck's approach to musical creativity asks the right questions, summed up as "how do we deal with music?" which in machine terms asks "to what human sensory needs does music conform and how may those needs be simulated to produce a musical response?" The difference between this and serialist or dialogue approaches is that the sensory modality implies motivation on the part of the computer model rather than a tendency to respond only when provoked. This is significant in two ways, 1. in that it corresponds to human behaviour in the real world, and 2. in that it conforms to the way music (both as sounds and as composition) is normally produced. Patterns of change in music and speech are humanly necessary to maintain consciousness and avoid fatigue, and acoustically necessary for optimum spatial definition. Human beings are naturally curious and mobile, in pursuit of which structured acoustic behaviours not only serve to illuminate the immediate environment, but have the potential to influence and control the actions of others in the environment, which is one reason why cars are fitted with horns as well as airbags.

How adaptive theory works in a musical sense, in melody generation at least, is clearly outlined in Martin Gardner's commentary on the fractal music of Benoît Mandelbrot and Richard Voss (10) and applied more specifically to conventional music in Chris Cunningham's and my own paper "Computers Unveil the Shape of Melody" (11) in which the limiting parameters of Voss's melody generating program are discussed in direct relation to recognizable musical types ranging from medieval chant, through folksong and baroque inflections to atonal (Schoenberg), and stochastic (Xenakis). Having determined for myself the numerical constraints of fractal melody generation, involving the derivation of a compositional formula from actual atonal melodies by Schoenberg (the soprano melodies at [59] and [74] of the Op. 10 Second String Quartet, fourth movement) I have little hesitation in dismissing the Lerdahl–Jackendoff hypothesis *as a complete waste of time* since it is a theory without predictive or explanatory power in relation to genuinely new music and is dedicated to the intimidation of anyone who thinks otherwise. The ideological desperation of the Lerdahl–Jackendoff commitment to tonality as somehow embedded in human nature is exposed in the simple activity of natural speech. People in normal conversation speak in atonal cadences because to do otherwise would be personally tiresome as well as expose them to ridicule. Angular melodies of Schoenberg, Webern, or Mozart are more naturalistic than conventional

song. Formal speech is explicitly atonal. Undergraduates auditing a piano transcription of the cylinder recorded voice melody of Florence Nightingale's 1890 speech to future generations, reproduced in *The Second Sense*, readily identify it as a melody in the style of Schoenberg. (12)

Reybrouck follows Guilford and Dewey (both non-musicians) in interpreting adaptive behaviours as problem-solving. I think this view is wrong as well as outdated. Routine patterns of behaviour expressed in music can be construed as tactical strategies to manage an ongoing potential for disorder. The rigid behaviour patterns of autism are intelligent behaviour in exaggerated form, brought on by enhanced sensitivity to acoustic stress caused by a deficiency or absence of sensory processing mechanisms, notably the superior olive, a way-station for auditory processing. (13)

That creativity operates by analogy can be regarded in one sense as a restatement of the Platonic doctrine of essences, and in a related sense as Popperian falsifiability in disguise (words stand for, but are not equivalent to, things, hence things stand for, but are not equivalent to, types). However, analogy in the preferred sense of Irène Deliège's paper "Creative support for a model of listening" is also another word for myth: the cultural expression of essential relations "in images that are not, at first sight, related." The author offers the slightly disconcerting, if anthropologically suggestive, example "the men of this tribe resemble string beans" as expressing "the attitude of thinness." Of the attenuated figures of Giacometti's sculptures, on the other hand, one can argue that their needle-like thinness is a statement not only (and perhaps not at all) about physical emaciation, but also (or rather) a statement about human location in time and space: the body reduced to a gnomon, feet firmly attached to the ground.

More to her point, perhaps, is the interpretation of dance forms as studies in time and motion, or ballet as the humanization of abstract time relations, which discusses the same issue from the opposite direction. Again, if canon is the idealized depiction of natural echo, then one asks what fugue resembles in nature, since the object transpositions of fugue involve a perception of identity relations, in pitch, timescale, and inversion and retrograde forms, that have no direct correspondence in natural acoustics (one reason, I am inclined to think, why inverted and retrograde forms play so inconspicuous a role in the serial identity relations of Stockhausen's *LICHT*).

Creativity theory in music arose at a time (1950) when formal analysis of music was based on reading the printed score rather than listening to music. That cognitive theory remains locked in the grammatical prejudices of the nineteenth century after more than one hundred years of music dissemination in recorded form, and is still unable to recognize, let alone account for, the music of Schoenberg, Webern, Boulez, or Stockhausen, offers scant reason for confidence that its proponents are on the right track. Maud Hickey and Scott D. Lipscomb introduce their paper "How different is good? . . . The assessment of children's creative thinking" with an imaginary evaluation of a fifth-grade assignment in MIDI composition. The children have been instructed to compose a *song* (*sic*: the term here means an instrumental composition, or simply a melody)

. . . in 3/4 time and in the key of B flat. . . . But when you get to Nora's song you are startled.

Though she did write in 3/4 time and used the B flat as asked, she clearly experimented with several different timbres and composed a jagged atonal melody full of wide leaps, accompanied by alternating loud/soft tone clusters using an electronic-sounding timbre. It didn't sound very 'good' to you, yet it was somehow interesting. Was it a random mess? Or did Nora compose this song deliberately? How should it be graded? How do you respond to Nora? etc.

The authors' conflation of a problem of musical *intelligence* with one of *assessment* sends the alarming message that a successful educator must learn to be creative in assessment in order to satisfy the terms of employment of an education policy designed by people by implication ignorant of, and opposed to, musical intelligence. Hence the view of psychologist, music educator and business consultant Teresa Amabile that "it is not possible to articulate objective criteria for a creative product." In this field, however, children's composition is encouraged with the ulterior motive of facilitating understanding of their *social* development, and to that extent has nothing to do with music at all. Trailing after a five-page citation of studies in compositional development that conjures up a vision of an endless procession of leaf-cutter ants, Pamela Barnard ("Understanding children's meaning-making as composers") observes "composing in classrooms occurs within communities in which 'the practice' of composing evolves through children's mediated actions in a compositional process and in the way they interrelate with contextual elements." As Spock would say, not music as we understand it, captain.

Despite her involvement in a truly hideous test (the IBIS Project) inflicted on 132 primary school children and involving "a soprano glockenspiel with a range C3-F4 with 2 beaters and a tambourine" one feels sympathy for the disgruntled Johannella Tafuri of Bologna Conservatoire when she complains "Why do I have to teach children to compose? What is it for?" The author wrestles with the question whether a composition produced 'intentionally' means that it cannot have been created by chance, even though it may have been spontaneously generated. G. F. Welch's 1998 model of the ontogenesis of musical behaviour lends a plaintively minimalist graphic (empty cross-hairs) representing the interaction between culture and creative ability, and provoking a rush of breathtaking admissions, among them the truly preposterous statement that the creative ability of a newborn is zero.

By contrast, "Creativity, originality, and value in music performance" is a witty and diplomatic contribution by four representatives of the Royal College of Music (Williamon, Thompson, Lisboa, and Wiffen) that attempts with some success to shift the focus away from theory and toward actual music. One appreciates their endorsement of Paganini and Liszt as embodiments of creativity, first because the statement is the sort of cliché associated with cognitive psychology but generally spurned by musicians, and secondly because public adulation of the performance and creativity attributes of Paganini, Liszt, Chopin and other male virtuosi originated among a largely female leisure class that first began to influence public taste in the industrial age. There is a nice sceptical edge to citations of expert opinion: John Hospers' distinction between "highly original" and "slightly original", for example, and arbitrating between Beardsley and Sibley on "notable" difference and "relevant" difference. At times their conversation is conducted on a number of levels simultaneously:

A thing can only be original relative to other instances of the same type of thing within a given

culture. We would not say, for example, that a piece of Indian music is original by virtue of being different from music of the Western classical period, although it might well be original when considered against other works from the Indian classical repertoire.

The sting in the tail is that to identify a performance of Indian music as “original” in comparison to music of the western classical tradition is the giveaway mark of a culture—by implication, cognitive psychology—that does not recognize the difference between western classical music, which is predicated on the exact execution of specified tasks, and Indian classical music, which is predicated on spontaneous invention. One looks forward to what the authors may have to say at greater length about cognitive issues embedded in actual works: for example, of concepts of “originality” and “difference” in relation to Satie’s *Trois Gymnopédies*; of Berio’s Mahler montage in *Sinfonia* as a “stream of consciousness” exercise after Samuel Beckett, and of the cognitive implications of Stockhausen’s intuitive music.

Jane Davidson and Alice Coulam’s comparative study of classical and jazz performance examined video recorded interpretations of the aria “Summertime” from *Porgy and Bess* by Gershwin. The objection that something interpreted is *ipso facto* not created, since only a thing of which a preconception is entertained can be interpreted (in contrast to spontaneous improvisation), is answered by a confused citation from Nicholas Cook to the effect that performance skills are creative by virtue of being applied to the interpretation of a musical syntax within a framework of personal invention, another way of saying that an artist’s life is by definition an ongoing work of art. Outstanding among a number of claims adduced in support of this thesis of masterly inutility is Maria Callas’s reputed inventiveness in covering up a lack of control in her upper register by carefully managed histrionics, which is quite a stretch.

Chaffin, Lemieux, and Chen (“Spontaneity and creativity in highly practised performance”) address the paradox of a classically scripted and memorized performance exhibiting traits of spontaneity that in other circumstances are identified as creative in nature. Their paper begins with a perhaps ill-advised quotation (“It’s different each time I play”) from pianist Emil Gilels, a great artist but a spectacularly messy and inaccurate performer. It focuses on the mental and physical preparation of a recording of the third movement of the *Italian Concerto* by J. S. Bach by a colleague, Gabriela Imreh. The study asks if the key to spontaneity in memorized musical performance may be revealed in what the performer is thinking about while the performance is taking place.

This appears sophisticated. A fluent performance requires a Zen-like state of “no-mindedness” or mental detachment from the physical act. What we have, however, is a familiar baroque work in *moto perpetuo* style, intended to be performed as if by clockwork. The issue of expression in this case has either to do with spontaneity defined as *involuntary* deviations from an ideally mechanical performance, or creativity as the *deliberate* introduction of expressive cues into an otherwise neutral execution. It cannot be both. A survey of recordings of the familiar Bach Prelude No. 1 in C major shows that the challenge of such “expressionless” music is both real and unresolved.<sup>(14)</sup> In addition, the test piece is composed for a very different keyboard, designed to ensure evenness of touch, hence to eliminate spontaneous inequalities of emphasis. The entire exercise seems like too little, too late, since

exactly the same ground was covered with considerably more thoroughness over a century ago by US and European manufacturers of Duo-Art, Welt-Mignon, and Aeolian reproducing pianos, a project in which Harold Stetson's Ph.D. paper of 1897 indicated that the seemingly infinite variety of tone and touch nuance available to a pianist could be reduced to just two measurable quantities: velocity and timing.(15)

To some observers, music therapy is a quasi-discipline masquerading within a pseudoscience. Since we cannot ban music therapy, we can at least inquire into the methods of those who practise it and their musical aptitudes. Given that for over two centuries musical activities and rituals have played, and continue to play, a major role in early childhood education, one is entitled to question the judgement and the morality, as well as the utility, of subjecting allegedly dysfunctional children, in the name of freedom of expression, to therapies of spontaneous improvisation antithetical to the acknowledged therapeutic values of traditional music. The practice of music therapy outlined in Tony Wigram's paper "Musical creativity in children with cognitive and social impairment" is surely a suitable case for inquiry in its own right as its symptoms (procedural rigidity, inability to relate to normal music, intellectual and creative infertility, authoritarianism, etc.) constitute a mirror-image of the pathology itself. The "free improvisation" spuriously endorsed by Juliette Alvin as sanctioned by modern musical practice, is a sham. Stravinsky is cited (incorrectly) in its defence, but what we are dealing is not an issue of semantics but a sociopathic aversion to new music in any form, from atonality in Schoenberg to chance music by Cage. That so dangerous a misapprehension of what contemporary music is actually about should not only pass unchallenged as an expression of musical intelligence but be advanced as a pretext for aversion training of the young and vulnerable is as shameful in principle as it is grotesque in practice.

And all the more irrelevant given the wide availability of musics, both western and non-western, of exact and demonstrable therapeutic value, from the monotone chant of a Shinto priesthood, via the vastly distended syllables of Perotin, to the gestural play of Stravinsky's *Petrushka*, the endless chord of Stockhausen's *Stimmung*, and the obsessive iterations of Steve Reich and Philip Glass. With such a rich variety of musical behaviours to choose from, who needs improvisation? If listening to Mozart can improve the performance of the already intelligent, denying exposure to Mozart to the suffering is a policy of neglect compounded by the indignity of enforced interaction.

Nor am I sure that Aesthetic Music Therapy as described by Colin Lee ("Aesthetics of creativity in clinical improvisation") is the answer. The author's goal of "understanding musical creativity as a non-verbal means of communication" appears admirable in principle until one realises just a few sentences later that his operative definition of music as "clinical improvisation" is just the same old methodology dressed up in new and ill-fitting body armour. It is one thing for the profession to aspire to a condition of methodological sanctity closer to Oliver Sacks than Josef Mengele, and quite another matter to know how to get there. Drifting in a sea of professional uncertainty and clinging to improvisation as to an upturned liferaft, the author can only dream wistfully of the lifesaving possibilities real music has to offer:

Many great composers including J. S. Bach, Mozart, Beethoven, and Liszt were known to be accomplished improvisers. Schubert's style of composition can be seen to be similar to the

creative process of improvisation. . . . It is interesting to think of Schubert as a composer influenced by improvisation, and this raises the question of whether, if music therapy had been a profession in his day, he might also have been a clinician.

Which of course, in his own way, in the *musical* way, the composer actually was.

Amid the general clamour Julie P. Sutton's thoughtful paper on silence ("Hidden music: An exploration of silence in music and music therapy") comes as a relief. Silence in music is aptly and inevitably associated with John Cage: the book of writings *Silence* (1961) and the silent composition *4'33"* (note the date: 1952). It is not intended unkindly to suggest that the author might have made her point even more eloquently by writing nothing at all, allowing the reader to meditate on twenty blank pages instead of only one. Along with the notion of passing time and filling the void, the meaning of absence is an ongoing subtext of classical music discourse. The absence of a voice in John Dowland's *Lachrymae* is a case in point;(16) Stockhausen's use of mime and concept of "coloured silence," in *INORI*, are others.

That prolonged music training of the conventional (classical) kind leads to more focused and efficient use of brain capacity and stimulates cell growth at significant sites is an encouraging conclusion of Lotze, Scheler and Birbaumer's "Mapping cerebral differences in musicians" in which an increase in auditory complexity of music is correlated with the prefrontal lobe EEG pattern of the listener, a correlation much higher for subjects who are used to listening to complex classical music than those who prefer pop music. In the thirty years since Critchley and Henson's ground-breaking symposium *Music and the Brain* (17) enormous progress has been made in brain imaging, though unfortunately it has not led to noticeable improvement in clarity of exposition in this particular field. The section on musical creativity and brain function reads all the same as an agreeable antidote to the metaphysical speculation passing for science elsewhere. That it is possible to write lucidly and gracefully about music, art, and mental function in terms accessible to the lay reader and musician is shown by the number of eminent scientists who succeed in doing so: among them Oliver Sacks, Harold Klawans, and Gerald Weissmann. Expertise in this field is certainly of greater relevance to the future understanding of artistic creativity than anything to be found in Schopenhauer, Schenker, Adorno, John Searle, Said, Boulez, even (alas) Daniel Barenboim of recent memory.

Poor communication is also the message of Brattico and Tervaniemi's "Musical creativity and the human brain." The fault lies not in the authors, but their musical advisers, unable to furnish the most basic definition of creativity, veering from the fatuous "any musical activity can be considered creative" to the fanciful "all music must reflect the psychological propensities and capacities of humans as composers, performers, and listeners" (Sloboda, 1998), by way of the merely unhelpful "a more complete act of musical creation is accomplished by the performer who improvises" (Clarke, 2002), only to culminate with "there are always several ways to perceive and enjoy a musical piece," a literary gem from Besson and Schön (2002, p. 273).

Studies of the distribution of brain activity involved in pitch discrimination tasks have found vowel change is processed in the middle and supratemporal gyri of the left auditory

cortex, whereas chord change is processed in the supratemporal gyrus of the right auditory cortex. “Results point to a hemispheric specialization for phonetic vs. musical processing. . . . speech and music functions are highly independent.” An interesting conclusion to which the musician responds, what process or partnership is implied by mouth or jaw harp music, where vowel formants are exploited melodically? What are the neurological implications of Messiaen’s organ timbres, using mixture stops as an intermediate stage between timbre and harmony? Or Jean-Claude Risset’s or Pepe di Guigno’s IRCAM computer-generated timbres, which are generated as tone-colours but manipulated as harmonies?

Elsewhere the authors report on researches (Münste et al., 2001, Nager et al., 2003) demonstrating the superior attention skills of conductors, compared to pianists and non-musicians, in relation to sound bursts from a semicircular array of nine loudspeakers. I find this interesting because the same attention skills are part of normal training, and are arguably better developed among Tonmeisters (balance engineers with classical experience). My reason for saying so is having suffered the embarrassment, while taking a class in technical listening for undergraduate Tonmeisters at Surrey University, of not hearing the trumpets switch channels in the middle of the movement “Gagaku” of Messiaen’s *Sept Haï-Kai* in a recording conducted by Boulez. (18)

According to Olivetti Berlardinelli (“Mental activity during music processing”), non-tonal music, summarized as “the radical change in compositional rules from Schoenberg onwards,” is deviant and inexplicable, hence normal definitions of creativity no longer apply. A doctrinaire failure to cope is padded out with blanket assertions, of the kind more usually encountered in the witless blather of Dr Scrotum, Chomskyan musicology and evolutionary cognitive science (Wright et al., 2000) that “probably all attempts like Schoenberg’s are rebellious rather than truly creative.” Just how inadequately informed these supporters can be is shown by Stenberg’s diagnosis of Stravinsky as an “advanced forward incrementor” on the grounds of rhythmic innovations in *The Rite of Spring* achieved “without discarding the tonal system,” the author quite forgetting the much greater rhythmic complexities to be found in the composer’s works after 1957, when he abandoned tonality for serialism.

It is not all bad. The author concedes that Lerdahl and Jackendoff are “unable to account for music of other cultural traditions or even contemporary atonal music,” which is at least a start. The conclusion, that musical creativity is “tied to individual modes of reducing the discrepancy produced by the input information . . . to the listener’s [individual] cognitive style” corresponds ultimately to a definition of creativity as a self-administered therapy: a reflexive diagnosis which, if it allowed the rest of us to do away with professional therapists, might lead to a very desirable outcome.

Impatience at the trivialization of creativity by various branches of science emerges in separate papers by François Pachet of which the first, “Creativity studies and musical interaction” is a trenchant overview of the state of current inquiry that might usefully have included references to computer poetry and randomization processes in twentieth-century literature (from T. S. Eliot and Dylan Thomas to Kurt Schwitters, William Burroughs, and of course John Cage). Pachet criticizes the information theory-based simulation of musical styles by extraction and substitution of body parts, which one might describe as the Frankenstein

theory of musical creation, but has nothing to say about the obvious benefits of computer transcription as a way of quantifying expression. In a second paper, “Enhancing individual creativity with interactive musical reflexive systems,” an opportunity to critique significant developments taking place on his own doorstep, at IRCAM, and involving composers and musical creations of genuine substance (Boulez, Stockhausen, Jonathan Harvey) is discarded in favour of simplistic machine automated processes of the kind encountered in cheap domestic synthesisers.

Finally, Peter Todd and Eduardo Miranda’s “Artificial life and models of musical creativity” addresses the application of artificial life systems (or *Alife*, hence “Get . . .”) to create music. The approach is amusing, revisiting the terms of music simulation software from the 1950s from which the interactive element of Boulez and di Guigno’s *Répons* and *Explosante-fixe* is also descended. That the “musification” of human activities, as a way of creating identifiable musical characters, is culturally authentic is shown in folk tradition and the blues; but the attempt to create interactive *amatory* relations among different musical character types from which new hybrid forms can be spontaneously generated is essentially no different from Mathews and Rosler of the 1960s.<sup>(18)</sup> That the authors appear oblivious to the transformational implications of classical sonata form, or the theme and variation form beloved of amateur brass band competitions, is par for the course, though a mention of Messiaen’s bird imitations (which express difference but, to be fair, do not truly interact), or the voice and instruments of Berio’s *Circles* (which do both), might have been welcome. Alas, not even a nod toward Xenakis, whose *Stratégie* for two orchestras (1959–62) arguably set this particular train in motion, and compared to which their own studies appear trivial as well as inconclusive.

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### Notes

1. In *Harmonicae Mundae* (1619): see Owen Gingerich, “Kepler, Galilei, and the harmony of the world” in Victor Coelho ed., *Music and Science in the Age of Galileo* (Dordrecht: Kluwer, 1992), 45–63.
2. See Mary Berry, “Gregorian chant: The restoration of the chant and seventy-five years of recording.” *Early Music* 1979, 197–217.
3. William Pole, *Philosophy of Music: Being the Substance of a Course of Lectures Delivered at the Royal Institution of Great Britain, in February and March 1877*. 2nd rev. edn. (London: Trübner & Co., 1887), 5–9.
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