

Musical Perception and Exploratory Music

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How do we hear sound? In a recent article,¹ cyberneticist Marvin Minsky advances the hypothesis that each perception is the work of many different agents within the brain. Each of these agents he defines as a specialized nerve net whose function is one particular form of identification. For music, he identifies some of these specialized agents by taking analogies from current research on the nature of vision:

“Feature-finders listen for simple time-events, like notes, peaks or pulses.

Measure-takers notice certain patterns of time-events, like 3/4,4/4,6/8.

Difference-finders observe that the figure *here* is the same as the figure *there* except a perfect fifth above.

Structure-builders perceive that three phrases form an almost regular “sequence.”²

In other words, when we listen to music, our brains sort through a number of pattern recognition routines, and if the music conforms to a certain number of these patterns, both biologically inbuilt³ and culturally conditioned, with sufficient novelty so as not to bore, we experience an emotion. Furthermore, this experience occurs without the necessity of an intermediary verbal identifier in the brain. When we hear a pretty sound, it is not necessary for us to think “pretty” in order to feel the pleasure thus communicated. Indeed, one of music’s chief delights, intellectually, is that it offers the option of a non-verbal mode of brain functioning/expression, one of the few areas of human activity which can do this.

1. “Music, Mind, and Meaning” – Marvin Minsky, *Computer Music Journal*, vol. 5, no. 3. Cambridge, Mass., USA; MIT Press, 1981
2. *Ibid.*, p. 39
3. cf. Manfred Clynes *Sentics* 1978, New York: Doubleday, in which he details his work on the physical basis of human emotions and how music and sound are used to convey physical signals which trigger off these emotions.

How do we know things? How do things become meaningful and significant for us? Minsky again:

“What is the difference between merely knowing (or remembering, or memorizing) and understanding? We all agree that to understand something we must know what it means, and that is about as far as we ever get. I think I know why this happens. A thing or idea seems meaningful only when we have several different ways to represent it – different perspectives and different associations. Then we can turn it around in our minds, so to speak: however it seems at the moment, we can see it another way and never come to a full stop. In other words, we can *think* about it. If there were only one way to represent this thing or idea, we would not call this representation thinking.”⁴

As a real-life example of this, consider a commercial rock song. You hear it on the radio. You see the film clip on TV. You buy the single, and play it on your stereo. You look at the single’s cover-art. You buy the album. You read the liner, and look at its cover-art. You read an article about the singer/performer/song in a magazine. You see the equipment used to make the song in a music shop window. You go to the concert and see the song performed. If, in any of these cases, substantial inaccuracies in the representation of the song exist, such as lies in the article, a bad needle on your stereo, lousy acoustics in the concert hall, misrepresentative cover art, it doesn’t matter. Each of these activities merely provides another “meaning” which contributes to the larger meaning which the song finally comes to have when we “know” it. Again Minsky: “Something has “meaning” only when it has a few . . . that is why seekers of the “real” meanings never find them.”⁵

How do we become bored with things? We can become bored simply by getting too much unfamiliar information to process in too many ways, and we switch off. Or, we can become bored by knowing a thing too well. As Douglas Hofstadter states, “You get bored with something not when you have exhausted its repertoire of behaviour, but when you have mapped out the limits of the space that contains its behaviour.”⁶ People tire of Rubik Cube Puzzles Or Space Invaders games not when they have done every possible version, but when they see the rules well enough so that no new surprises result except with more mental or physical effort than they are willing to give. Similarly with songs. Once you’ve heard the song on the radio, as a single, on the album, read the articles, and seen the film clip, and looked at the album covers, you want novelty – a new set of variants on these behaviours. So you listen to new songs until one strikes your fancy, then you enter the world of covers, articles, film-clips, and records once

4. Minsky, op. cit. p. 29

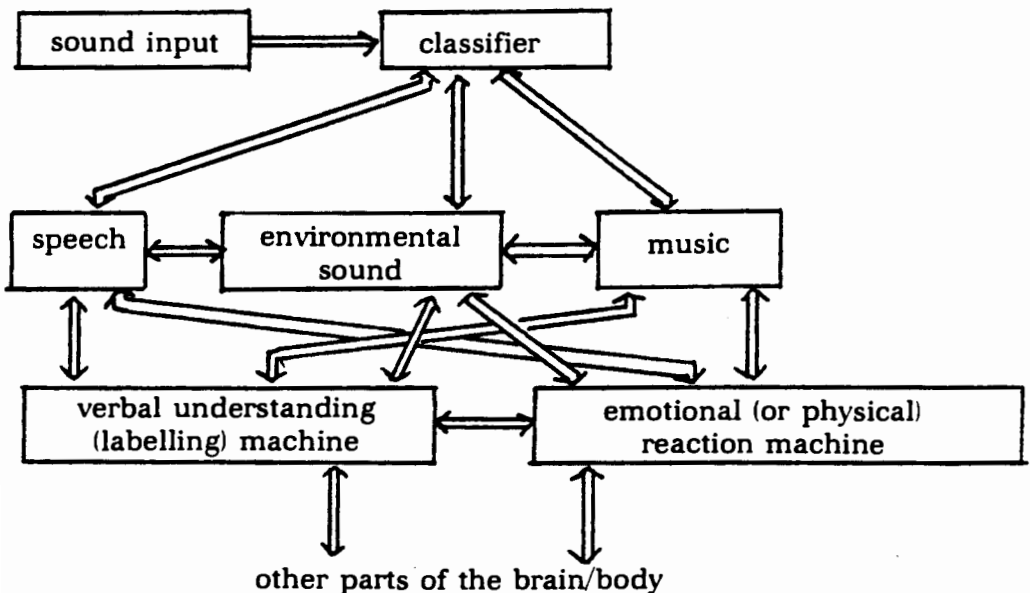
5. Ibid.

6. Douglas Hofstadter: *Godel, Escher, Bach: An Eternal Golden Braid* 1981, New York, Vintage; p. 621

again. Eventually, thinking structurally, you may tire of the whole apparatus which surrounds that particular music as well as the music itself. The music might not “appeal” to you any more – you’ve “outgrown” it; your “tastes have changed.” So you look for another type of music to like, and learn *its* set of reinforcing activities, such as new magazines, clubs, venues, new sections of the record store, etc. What has happened here is that you have become familiar not only with the rules of one game (a song) – but with the rules of the family of games (the genre) you were interested in. And all this, of course, can happen absolutely on the non-verbal level. You don’t have to think (though of course, you may) “I am bored”; you simply feel bored. You feel dissatisfied, frustrated, and want something else.

How do we hear sound? We hear a number of different sounds every day. I would like to classify them into three types - speech, environmental sound and music. By speech I mean human utterance that is in a verbal language the listener understands. By music, I mean those combinations of tones, and *only* those combinations of tones, that the perceiver regards as such. (For purpose of this definition, if someone says, “That’s not music!” for them, they are, until further information can be given to them, correct, and the sound combinations under consideration are, indeed, not music.) By environmental sound, I mean just about everything else, whether man-made, mechanical or naturally produced.

I would like to propose the following diagram of how our brains listen to sounds.



In this diagram, all three modes of sound perception operate simultaneously and feedback to classifier and interact with each other and the reaction machines below them. Usually, however, one mode of perception *appears* dominant. (When someone talks to you during a record, the record usually becomes "background" to your conversation). Some sounds, of course, will operate between these "centres", and others will, from time to time, cross over the boundaries our perceptions seem to raise. In learning a new language, for example, one class of environmental sounds – foreign languages – become intelligible speech. Or in experimental poetry, for example, by subverting the rules of grammar, speech becomes environmental sound or even music. Indeed, one of the most marvellous things about our brains is that they are learning machines, continually able to expand, revise and update their definitions of, and responses to, material. But our brains also erect fairly stringent rules of pattern recognition and matching for each of their perceptual categories, and it is only rarely that we literally "change our minds" about something.

Much of the work on music perception done in the past twenty years, by such people as Diana Deutsch, Manfred Clynes, Marvin Minsky, David Wessel, and James Tenney, among many others, has focused on what the "average" brain considers "normal" music. The findings suggest much about human rhythms, the need for repetition, the biological basis of tonal centering, etc. Other psychoacoustic researchers have, through either scientific or artistic experiment, asked fundamental questions about how we hear such things as timbre (the tone-color of sound), how the psychological mechanisms of tuning or pitch-making work and to what limits they can be pushed. An example of the first is Robert Erickson's "Loops: an informal Timbre Experiment,"⁷ a series of studies for six instruments where a series of very rapid notes are played, each successive one by a different instrument, so that melodies of tone-color, as well as melodies of pitch, are heard. Successive studies of this nature were also made by John Grey of Stanford University, and myself. In my work, "reLoopse" (1979), five families of synthesized timbres rapidly alternate in such a way as to form a number of contrapuntal lines out of what is, in reality, only a single line melody. An example of the second is Kenneth Gaburo's "The Flow of [u],"⁸ for three voices, where three singers sing one pitch, and one pitch only, for twenty-six minutes, alternating breathing and masking their entrance in such a way that no breaks whatever are heard in the sound. The sound waves, like laser light, seem to become coherent.

The result of all this work has been a mapping out of the limits of current brain/physiological musical potentials, both in terms of perception and performance. What has been basically found out is that the brain is a pretty conservative machine – it wants certain levels of information redundancy before it is satisfied – but that it *is* capable of growth, or change.

7. Erickson, R. "Loops: An Informal Timbre Experiment" *CME Reports* 1975 – Centre for Music Experiment, University of California, San Diego.

8. Gaburo, Kenneth *The Flow of [u]* 1975, Lingua Press, Ramona, Ca.

Similarly, the work of Bell Labs in Murray Hill, New Jersey, to establish minimum levels of information required for intelligible transmission of speech is of interest here in that it maps out some limits of the speech centre's behaviour, and the behaviour of the brain when that mode of sound perception is dominant.

As for environmental sound perception, much work has been done, and among others, two modes of perception seem to emerge – what I will call the “biological-automatic” mode and the “open” mode. In the “biological-automatic” mode, one hears a sound and reacts. Manfred Clynes' work on sound as a means of basic physiological emotion pattern transmission, his work on the “sentic”, or emotion carrying aspects of sound, is of interest here, as are the various researches into reaction to the cries of infants. As for the “open” mode, it is a mode of perception that scientists seem to not have done much work on, though poets have. Henry Thoreau in his *Journal* for 1852:

A child loves to strike on a tin pan or other ringing vessel with a stick, because, its ears being fresh, sound, attentive and percipient, it detects the finest music in sound, at which all nature assists. Is not the very cope of the heavens the sounding board of the infant drummer? So clear and unprejudiced ears hear the sweetest and most soul-stirring melody in tinkling cowbells and the like (dogs baying at the moon), *not to be referred to association*, but intrinsic in the sound itself; those cheap and simple sounds which men despise because their ears are dull and debauched. Ah, that I were so much a child that I could unfailingly draw music from a quart pot! Its little ears tingle with the melody. To it, there is music in sound alone.⁹ (my italics)

I had a similar insight when several weeks ago, we had a rather spectacular thunderstorm. I sat out on my front porch, overlooking the rooftops to the east, observing. I didn't know where the thunder and lightning would appear from next, but I watched, with open anticipation and keen interest, each new event. An entirely different set of physiological processes were being used, different from the ones used when I listened to “music”. Human rhythms became meaningless – the need for repetition, tonal centering, etc., irrelevant. I was listening to something out of human control; I had achieved that state of openness where I *could* listen to the storm. Perhaps I was now ready to listen to music without the “music” centre in my brain being activated. (What a blessing that would be – to be able to transcend the limits of my physiology!)¹⁰

9. Thoreau, H.D. *Journal*, vol. 4, p. 85. 1962, Dover Publications, New York.

10. This paragraph, and several others in this essay, have been criticized by several people for their use of the first person. I would stress that these paragraphs are based on absolutely empirical personal observations, and not theorizing.

John Cage, and more recently in Australia, Bill Fontana, have talked about listening to sound in this way also. This brings up an interesting point in relation to those who insist that every sound is freighted with meaning; that there is no innocence; that one can't escape one's brain labelling each sound with another verbally-labelled or associative meaning. What Cage and Fontana seem to be saying is that you *can* turn off the associative machine in your brain and listen to sound – openly, averbally, and find it rewarding. Indeed, the application of this “open” mode of environmental sound perception to “music” perception has been one of the most powerful innovations in musical thinking over the past thirty years. It has led, perhaps, to our finally coming to see “music” perception, and all sound perception, as a pluralistic contrapuntal system – with all of the modes of sound perception – “open”, “musical”, “biological-automatic,” “linguistic comprehending,” “linguistic-labelling,” and others, – as each being but one of the voices in the metaphorical fugue of our consciousness.

Of what use is music? We physically need it, but to what uses do we put it? It seems to me that we have two principle uses for music:

- 1) music as a physical agent (music for healing, relaxing, dancing, loving, enjoying, working, etc.)
- 2) music as an agent of expanding consciousness (changing perceptions, expanding the realms of what is considered music, dealing with ideas about music and its uses, etc.)

For the first, which is the way we use about 95% of the music we encounter, music deals with the absolutely familiar patterns of the brain in an absolutely resposorial way, with just enough novelty (and no more!) to avoid boredom. The conservative music listening centre of the brain is being worked through to affect the whole body's well-being.

For the second, music usually does *not* deal with familiar matter. Indeed, the reason that there is a second use at all is that some musics just do not conform to our expectations of what “music” is. Faced with this, we either reject them and go back to the first use (in which case, minimal growth or “change of mind” occurs) or we grapple with the information presented until we do gain some handle on it and we find some way of fitting the information into the newly expanded definitions.

From this point of view, I would like to propose that the music that is the most interesting (though perhaps, not the most sensuously satisfying – for that return to the first use for more “normal” music) is of three types:

- 1) Music which expands the range of sounds our “music” centre will accept as “music.”
- 2) Music which expands the range of ideas we have about familiar sounds or musics.
- 3) Music which confuses the classifiers within the brain and seems to live on the perceptual “edge” of more than one type of sound category.

As an example of the first type of music consider the later music of Arnold Schoenberg.¹¹ In such pieces as the Piano Concerto, the String Trio, or the Phantasy for Violin and Piano, all from the 1940's, there is no sound which could not be considered "musical." It's all played on normal acoustic instruments using fairly normal playing techniques. And yet, when I heard these pieces, my first reaction was, of course, "that's not music!" On subsequent hearings, however, I began to hear these pieces as "music."

As an example of the second sort of music, consider certain pieces of Charles Ives, especially the "Three Places in New England" orchestral suite, or the "Holidays Symphony." Here is music (composed in the first decade of this century) which is jam-packed with familiar tunes, quotations by the dozen; a collage of familiar elements, each with its own associations, arrayed in a pluralist, simultaneously sounding manner. The tunes he uses are all found objects, each one has a very clear extramusical image, and a very clear emotional reaction associated with it. By combining these in different ways he allows the associations and emotions to rub against and resonate with each other creating a music which shows us what we already know (the familiar tunes), but shows it to us in a new way. Though some of his pieces actually present us with music that is organized in an unfamiliar way, and hence also fits into the first type of music considered here, even those pieces which are not so organized usually give us (at least) a new way of thinking about formerly familiar material.

As an example of the third sort of music, consider the music of John Cage. Cage says he would have us experience music as we do environmental sound. I feel what he means by this is for us to experience music with the "open" mode of environmental sound perception. Certainly, certain pieces of Cage's, when listed to as "normal" music, make no sense whatsoever. But when I heard these same pieces (the *Concert for Piano and Orchestra*, and *HPSCHD*, for fifty-two tapes, slides, films, and seven harpsichords) in the "open" mode, new sound experiences were revealed, and the light, joyous, lyrical side of Cage's musical personality became apparent. In this case we are listening to music in a boundary-crossing way, and much fertile ground for exploration is revealed here. What happens when we listen to music as speech, as in certain of the works of Kenneth Gaburo, such as the sixth section of his "maledetto" for seven speaking voices, where, after thirty minutes of rapidly articulated speech, the speakers burst into sustained tones on the phoneme [u], "singing," but in a most linguistically articulated way . . . To music as environmental sound, as in

11. My choice of musical examples has also been criticized as being too historical and not including enough Australian and no women's names. The reason for this is that in each case I wanted to use the most historical figure possible in order to give the broadest possible scope to my hypotheses and not tie them down to any one historical period – especially the most recent. As a redress for this, see my discussion of "Six Australian Experimental Composers" in a forthcoming New Music Section of *Art Network* (May, 1982), where I apply the principals developed in this essay to the work of Ros Bandt, Herb Jercher, Les Gilbert, Ron Nagorcka, Ernie Althoff, and Chris Mann.

Cage's work . . . To speech as music, as in Benjamin Boretz's "Language, as a Music" for solo reader/pianist . . . To speech as environmental sound, as in Jackson MacLow's "The Black Tarantula Crossword Gathas," for eight voices on tape articulating words and phonemes in an agrammatical way . . . To environmental sound as music, as in Alvin Lucier's "I am Sitting in a Room," or "Music on a Long Thin Wire" . . . To Environmental Sound as Speech, as in David Dunn's "Mimus Polyglottos," an experiment in interspecies communication? Or what about a music that works on perception contrapuntally – that is, in two centres, equally balanced, at once? Could one construct a music that continually kept more than one of the perception centres off-balance in such a way that none was ever dominant, and the brain was truly made to function in such a way that it was, for as long a time as possible, poised between two or more distinct modes of perception? These are the sorts of questions asked by the music which functions in this third category.

In fact, these three issues, expansion of what is considered music, looking at familiar objects in new ways, and crossing perceptual boundaries, seem to be at the heart of most of what has been considered "New Music" throughout the twentieth century. In the nineteenth century, the way to create a new music was solely the province of type 1 – the expansion of what would be considered music. In the early decades of the century, there was an expansion of the concept of how material could be considered new. Such diverse composers as Charles Ives, Erik Satie, and Igor Stravinsky, and the various Neo-classicists, Folk Song, and Socialist Realist movements all dealt with ways of placing older, pre-existing material in new musical and/or sociological contexts. Most of the whole area of Modern Music (ca. 1900-1950) was an expression of the dichotomy between the two ways of developing newness – unfamiliar material vs. unfamiliar contexts for familiar material. In this light, the Stravinsky – Schoenberg feud (promoted by followers of the two composers, but significantly, not by the composers themselves) of neoclassicism vs. atonality becomes an expression of these two ideas rubbing against each other. It also becomes a sad comment on those people who insisted on an either/or relationship between the two ideas and not a both/and relationship – which was in fact the historical relationship which developed.

Around 1950 with the work of John Cage and others, the third type – music which crosses perceptual boundaries – began to appear. Much of the music which has been called Post-Modern (ca. 1950-the present), or Experimental,¹² has dealt with this issue in one way or another, though recently, such composers as Gavin Bryars, in his "My First Homage," a piece for two pianos, two vibraphones, tuba, and cymbal, composed entirely of borrowed progressions from pieces by jazz composer Bill Evans arrayed into an evenly pulsed rhythmic flow; or Robert Ashley, in his "Perfect Lives/Private Parts," especially "The Bar", for rock band and solo speaker, have begun to explore the second type again.

12. Michael Nyman: *Experimental Music – Cage and Beyond*, Dutton, London, 1975.

Such is the state of exploratory music today, that all three categories are available for use, and significant activity is going on in all three. (And, as an aside – it is obvious that a piece may explore all three areas equally. Consider, for example, “Music on a Long Thin Wire” by Alvin Lucier, in which a single sine wave is played into a long metal wire by means of a transducer, that is, the wire *itself* is used as the sound producer. The resulting resonant bands of sound constitute the piece. In this piece we are being asked to listen to a physical phenomenon (environmental sound) as music, are being asked to accept an extremely slowly changing drone as “musical” and are being given new ideas about the resonant nature of a sounding matter. Like many type 3 pieces, it also addresses the issues of types 1 and 2.) But what holds all three categories together, and what makes exploratory music distinct from “normal” music is its espousal of different ends – musical, economic, sociological, and ideological – than those espoused by “normal” music. Furthermore, unlike the classical music of the nineteenth century, and unlike the “exploratory” pop music of today, as exemplified by such bands as Talking Heads, The Love of Life Orchestra, and Essendon Airport, it is *not* the aim of many of these musics to eventually function as “normal” music. That is, some of these musics, even those whose sole aim is the expansion of the range of activities the brain considers “musical” do *not* aspire to becoming “normal”. Consider Conlon Nancarrow’s work with player pianos, which gives the brain rhythmic combinations never encountered before, as a case in point. Some musics would like to remain in the categories they have created for themselves. As such they would like to remain as they are: a challenge, and an opposition to, the normally functioning modes of music in society. A challenge, in that they point out different ways of perceiving that are available, and an opposition, in that by their very existence, they oppose the monophonic world view of “normal” music which postulates the existence of only the one dominant mode of musical perception.

In “The Origin of Consciousness and the Breakdown of the Bicameral Mind,”¹³ Julian Jaynes advances the hypothesis that human consciousness – the way the mind works – is actually changing – i.e., undergoing an evolution – and the progress of this evolution can be measured not in eons, as in physical evolution, but in thousands, and even hundreds of years.

Marxists, among many others, state that art reflects the conditions of society, and the minds that form it. Therefore a good case could be made for pointing out that art reflects this evolution of consciousness.¹⁴

13. Julian Jaynes, *The Origin of Consciousness and the Breakdown of the Bicameral Mind* New York: Houghton-Mifflin, 1976.
14. A quote from British composer and performance artist Paul Burwell is relevant here: “I don’t know why people can’t understand ideas as expressed through music. I can see it in terms of patterns of conditioned response. Marx talked about the artistic ideas of the time reflecting the ideas of the ruling class. Now, it follows from that statement, that the places you’re going to have to look for ideas that are expressing anything other than the dominant ideology, are not necessarily going to be recognizable as what they are. That is, if all the music you hear is reflecting/reinforcing a dominant ideology, when you

I would maintain, however, that art can do far more than reflect such changes. I would maintain that it can participate in – and indeed – initiate such changes. I would maintain that those exploratory musics which set themselves up as distinct from “normal” musics and wish to remain as such, have as one of their aims, the participation in, and initiation of, such changes. By generating work that makes us grow, change and adapt in order to process it properly, we are participating in this evolution. By generating work which *remains* thus unprocessable for a long time – i.e., it makes us work, and work hard, we provide a continuing input into this process. Two examples of older music which I feel are still doing this – i.e., we haven’t yet processed all the information they have to give, are J.S. Bach’s “Art of the Fugue” (1750) and Ludwig Beethoven’s “Grosse Fuge, op. 133” (c. 1825).

A list of some of those musics which are, or at one time were, exploratory would include many names. Bebop, gamelan gong kebjar, free improvisation, and electronic music are just four that spring to mind immediately. Being involved in this evolution of consciousness is one thing exploratory musics have been about in this century. It will probably continue to be a central focus of them for some time to come.

come across something musical which is not reflecting that ideology/ways of ordering, you are not necessarily going to recognize it as music. This has happened. So there has to be a certain amount of deconditioning going on, which brings us back to dedeconditioning and liberation.” “Talking to Paul Burwell” by Sylvia Hallet, London, *Undercut*, London, August, 1981.