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The origin of music as seen from evolutionary science and from Alejo Carpentier's *Los pasos perdidos*

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Resumen

La literatura y la ciencia suelen coincidir sobre objetos de estudio de interés común. Un ejemplo sería los fundamentos esenciales de los diferentes géneros estéticos. En este estudio, retomamos la discusión y la reflexión sobre el tema de los orígenes de la música, en parte, para proponer que la convergencia entre la literatura y la ciencia sobre esta cuestión merece más atención por parte de investigadores que trabajan en los campos de estudios literarios, la musicología y las ciencias de la cognición. Para los estudios literarios, son importantes las indagaciones sobre el origen de la música porque nos ayudará a conceptualizar mejor los fundamentos primarios de la poesía. Por parte de los científicos, a su vez, que estudian las propiedades esenciales del arte verbal, la literatura representa una fuente de nuevas ideas para alimentar las próximas líneas de investigación. El tema de este ensayo es el diálogo entre las humanidades y la ciencia: ¿cómo van a poder acercarse los escritores y poetas, e investigadores en los campos científicos y no-científicos, para aprovechar los recursos que compartimos en común con el propósito de intercambiar criterios sobre la naturaleza subyacente de la música y la creación literaria?

Palabras clave

origen de la música, evolución, literatura, ciencia de la cognición, Darwin, Alejo Carpentier

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Abstract

Literature and science often converge upon objects of study of common interest. The essential foundations of the different aesthetic genres is one example. In this study, the long-standing discussion on the origins of music will be taken up, in part, to suggest that this kind of convergence deserves more attention by scholars working in literary studies, musicology and cognitive science. Serious inquiry into the question of the origin of music is important for students of literature because it may help form a better understanding of primal foundations of poetry. On the part of scientists interested in fundamental properties of verbal art, literature, in turn, is a source of new ideas for future research. The theme of this essay is the humanities-science dialogue: how can creative writers, and scholars from both scientific and non-scientific fields share common resources for the purpose of exchanging views on the underlying nature of musical and literary creation?

Key words

music origin, evolution, literature, cognitive science, Darwin, Alejo Carpentier

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The origin of music as seen from evolutionary science and from Carpentier's *Los pasos perdidos*

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1. Introduction

The evolution of music has been a topic that has attracted growing interest in recent years among cognitive scientists from different subfields. But as some have suggested, for a number of the most interesting problems in the study of knowledge and human nature, among them possibly the most difficult, we still might not be able to formulate the key research questions properly. One view is that contemporary science may not yet have at its disposal the tools to understand human creativity and the need for engagement in aesthetic endeavor (Chomsky 1988: 151–163, 2006: 27–28, 133–135). These objects of study may not be within the range of application of its current methods. Alternatively, the tools are available, but the possibility of systematic research on a given question might be very far off, as in the case of the origin of music and related art forms. In the meanwhile, we could look to other fields, literature in the first instance, for new ideas and for sorting out the logical possibilities for future research. Cautious and tentative speculation can be informed by recourse to non-scientific scholarship such as the analysis of literary currents and the work of individual writers who address problems of artistic creation. This review of the thinking on music origins will begin with an example that will lead us to consider more generally the dialogue between science and the humanities.

2. A view from musicology and Cuban narrative

The early work of the novelist and musicologist Alejo Carpentier lies halfway, chronologically, between the publication of Charles Darwin's *The descent of man and selection in relation to sex* (1981[1871]) and current theorizing on the origins of music and language. Two years after his historical study *La música en Cuba* (1979[1946]) was published, he undertook a journey to the upper reaches of Amazonia in search for headsprings and primary sources. There is some indication in his writings that Carpentier was familiar with the theories of

natural selection. But in reality he was not on a research expedition, and he never formally presented his observations as evidence to support any one theory of music origin because the observations were not a report of findings. He did however share an interest with present day evolutionary theorists: that the ethnographic study of present-day isolated pre-agricultural societies has the potential of providing insights into the foundational properties of art and human creativity. The literary reconstruction of a musical encounter in the Piaroa village, in the State of Amazonas, Venezuela, was never presented in a musicological study, but rather in the voice of the protagonist in his celebrated third novel, *Los pasos perdidos* (1985[1953]). Thus, in its final presentation it came to be rendered in the form of a fictional account. Recalling the debates among 18th Century philosophers and musicians Rameau, Rousseau, Laborde and their colleagues – see Head (1997) for a review – the protagonist (a musician) confronts two proposals regarding the origin of music, which provisionally we can characterize as “external” and “internal.” Of course, for the main character in the novel, even though he travelled “back in time” to witness an “origin” of music, his indigenous interlocutors were modern humans removed from this hypothetical evolutionary “origin” by the same many thousands of years that separated him. All of the participants in the “discovery” were recreations, along with the events themselves (even though they were inspired by an actual journey to the Amazonia of Venezuela and Colombia).

The musical journey back in time passes through, respectively, two modern periods (early 20th Century Cuba and the Haitian revolution of the 18th Century) in Carpentier's first two novels *Ecue-Yamba-O* (1990[1933]) and *Reino de este mundo* (1981[1949]).¹ In *Los pasos perdidos* an origin of music is

¹ In *Ecue-Yamba-O* the roots of popular Cuban music in the 20th Century are revealed in ancestral knowledge that reaches back centuries to the African traditions. The revolt against the French slave masters, in the second novel, calls upon and gathers strength from the same traditions, in this case a traditional oratory turned anthem. In the first novel, and continued in the second, we are introduced to the idea that musical creation needs to be understood as a fundamental constitutive human capability. One of the important contexts of this creation over the centuries can perhaps be associated with ritual performance, tracing the historical development of the relevant creative faculties to ancestral religious rites (Rae 1999). Beyond ceremonial discourse, the oral tradition as a whole provides the broader context for musical composition in general and for distinctive vocal music styles, such as antiphony. By the 1920s in Cuba, the musical traditions of Europe and Africa had already achieved the great convergence that we hear throughout the episodes of *Ecue-Yamba-O*. The gravitation of the rural sugar mill communities toward the city (setting of the novel) paralleled the transition,

reenacted in an indigenous village near the confluence of the Orinoco and Sipapo Rivers, within sight of the Monte Autana, speculating by means of the above-mentioned literary devices how it may have occurred over time in the early communities of prehistoric peoples. Within the novel itself the retracing of historical time is recapitulated; as Lassus (2005: 52) notes: “The story unfolds in this way as a continuous annexation of the present by the past. The very future appears to have already been consumed.” In a steamy tavern in the jungle river town of Puerto Anunciación down river on the Orinoco, *Los Recuerdos del Porvenir* [Memories of the Future], the narrator/musician ponders this retrospective (Carpentier 1985[1953]: 258). Successive periods of music history, represented in impromptu performances “witnessed” along the route of his expedition, led the protagonist to a “music prehistory,” as it was portrayed to him in one of the concluding chapters.

In a wide-ranging analysis by Colombian novelist Pablo Montoya Campuzano (2005), Carpentier’s speculation regarding the origin of music is distilled from *Los pasos perdidos*, such that a summary here is necessary – by total coincidence, during the same time, I had arrived at similar conclusions in a study of the same material (Francis 2006). Montoya begins by recognizing the historical and musical themes in the novelistic recount of Carpentier’s expedition, and the background to the competing theories on the origin of music. This recognition is all the more important in light of how the groundwork had been prepared conceptually in his earlier novels. In the end, the musician/protagonist rejects the mimetic theory of his mentor, that the

violent and tragic as it turned out to be, from oral tradition to modern literate culture. A second journey back in musical history is to the powerful discourse resources of Haitian independence in *El reino de este mundo*. Again, it is in the rich sonorous properties of the human voice (in lamentation, convocation, etc.) where the story seeks out essential features of musical ability. The strong prosodic patterns in the oratory of revolution cross over toward poetic discourse, pointing out one of the cognitive domains that language and music share in common. They share it common, Carpentier would suggest, because prosody might be part of an ancient precursor to language and music that we have conserved to this day. Later, in *Los pasos perdidos*, Carpentier’s protagonist struggles with the oral tradition-written literature distinction; for example, he comes to more fully understand that composition is not restricted to writing. Then a related question preoccupies him: what might be the purpose of producing a score if the completed work is never performed? After completing the third installment of what appears to be a series (*Ecue-Yamba-O*, *El reino de este mundo* and *Los pasos perdidos*), musical threads pass throughout the narrative of subsequent works, in *Concierto barroco*, and *La consagración de la primavera*, for example; see Birkenmaier (2003). However, the genesis of language/music theme of the three early novels, it appears, was laid to rest with the concluding chapters of *Los pasos perdidos*.

fundamental impulse of the first musical creation might have been “external” and imitative: prompted by the rhythm of natural sounds, bird song, and other non-human animal vocalizations (of practical value, for example, in hunting and gathering). In contrast, the “birth of music” is closely tied to special needs of human vocal expression, exceptional contexts involving fervent affective states, spiritual elocution, and all manner of intensely ardent encounters, natural and (perceived) supernatural. Thus, the essential principles of its emergence are to be found in the human voice, instrumental music initially playing a secondary role, and in melody taking precedence over harmony (Montoya Campuzano 2006: 58—59).² The case could even be made that the emergence of harmony (the “coordinated blending of voices”) is derivative of a basic vocal melodic ability (Brown 2007).

From the point of view of understanding the most remote origins, speech and music then would share a common genesis; “word” and “chant” are not clearly differentiated until the new line of prosodic resources of language begin to mark the transition toward a clear separation. In particular, we refer the reader to the full passage in *Los pasos perdidos* (coincidentally, also cited in Montoya and Francis) where this gradual differentiation is recreated: from “word that is already more than word... to something situated far beyond language, and that, nevertheless is still far from song” (Carpentier 1985[1953]: 186). The scene is the river community where the alternating voices of a shaman invoke the spirits that have already taken possession of the cadaver of a fallen villager.³ Poetry, in human evolution, preceding structured prosaic

² In the first three chapters of the novel we see the musician/narrator fleeing, not only from the commercialization of music, in which he himself participated, but also from what he perceived as the stagnation and crisis of European art music, parallel to the cultural ruin into which 20th Century Europe had fallen. Modern experiment and “speculation on sound frequencies” left him equally dissatisfied, propelling a search for a kind of foundational tonality: in song, from memories evoked by a *Mambrú* of playing children, a *Romance* sung by Rosario, the chanting at her father’s funeral, a new curiosity about the oral tradition verse of the *Odyssey*. In contrast, his interest in the indigenous instruments was not musical but rather for the purpose of complying with the mission entrusted to him by his former teacher. The sentiment upon finally discovering them was one of accomplishment, different from what he experienced upon recovering the creative musical impulse of years past, his own past, at the same time reflected in the historical past as it receded back in time, as the journey proceeded further south along the Orinoco.

³ The primordial musical event (at the end of Chapter 4) – first prefaced by preparatory ritual silence, commencing then with “an embryo of melody” in alternation with a voice from the bowel, of the spirit (p. 186) – was in fact foreshadowed six days earlier in the antiphonic chant of Rosario’s sisters and aunts at the funeral down river in Puerto Anunciación (p. 131). The “origin of music” is revealed as a *treno* [ritual lamentation], form that the musician

discourse, would then share the same point of departure, in this way making all the aesthetic genres vocal/verbal arts, in turn, derivative of religio-magical incantation and homage to the forces of a spirit world. Therefore, the aesthetic genres are not product of civilization, but rather trace their roots to the earliest of human expressive endeavor in the most distant prehistory. In regard to Carpentier's speculation, we should take note of a strong inclination toward Rousseau's (1966[1781]) theory of proto-song and proto-language emanating from a primary speech/chant integration. Inexplicably, in subsequent work he never returned to these themes, already anticipated in his two earlier novels. Here, interested readers should consult the study of Chornik (2011) who presents a sharply contrasting assessment of Carpentier's views to the one proposed in this essay.

3. Evolutionary perspectives on music

Darwin (1981[1871]) reflected on its evolutionary emergence: "As neither the enjoyment nor the capacity of producing musical notes are faculties of the least direct use to man in reference to his ordinary habits of life, they must be ranked amongst the most mysterious with which he is endowed" (p. 333). But nevertheless, "we have every reason to believe that man possessed these faculties at a very remote period" (p, 334), that the ancestors of *H. sapiens*, "our semi-human progenitors," practiced a rude form of music and possessed some sense of melody. Darwin presents the hypothesis that an ancestral music-like/language-like communication system, analogous to the song-like vocalizations of other animals, emerged as a precursor to fully formed language and music in early humans. Again, it is probably in song where we should look for the fundamental primitives of musical ability, rather than in instruments.

In a commentary on an idea of Spencer, that music emerged from the prosodic features of emotional speech, Darwin suggests that "musical tones became firmly associated with some of the strongest passions an animal is

subsequently selects for his first real work of art music to be composed in the newfound refuge of Amazonia. In this way, the object of the search for fundamentals is present in modern day survivals of early verbal/vocal expression that departs from everyday conversational language in special ways, one of the basic foundations of all aesthetic genre. The relevant context is one of intense affective state expressed in musical and music-like forms.

capable of feeling, and are consequently used instinctively...when strong emotions are expressed in speech" (p. 336). According to this version, ancestral music/language communication would have primarily served courtship display in the competition for mates.⁴ While also differing with Spencer's theory, Wallaschek (1970[1893]) took issue with Darwin as well. Rather than tonal features associated with vocal expression, he proposed that the generation of rhythmical patterns was the formative principle in the

⁴ Darwin's research predated the findings of modern anthropology, genetics and cognitive psychology. In addition, the prevailing conceptions of pre-agricultural societies encountered by many explorers, grounded in the ideology of 19th Century European imperialism, limited his ability to evaluate the level of evolution of culture in these societies. A case in point is his failure to understand the fundamental correspondence between the folkloric music of Europe and the traditional music of non-Western cultures (*The descent of man and selection in relation to sex*, Volume I: 64, Volume II: 333). In fact, what must be to this day one of the most puzzling contradictions of intellectual history is Darwin's strongly biased assessment of the indigenous cultures that he observed, in particular the implied inferior biological/evolutionary status of their peoples. Strictly speaking, even taking into account prevailing 19th Century prejudices, his views were backward and unscientific for their time, an especially curious theme being the deliberate comparison between the mental capacities and dispositions of non-human primates and "savages." The clear implication in this comparison is that there exists an equivalence between modern-day "barbarous races" and the precursors of fully modern humans; Alter (2007) provides an in-depth analysis. The similar imitative behaviors "in...monkeys, in microcephalous idiots, and in the barbarous races of mankind" (*The descent*, Volume I: 56—57), for Darwin might have correlated with measured differences in skull capacity: between Europeans (92.3 in³) and savage races (81.9 in³ for Australians) (*The descent*, Volume I: 146). Commenting on discontinuities in the fossil record, "breaks in the organic chain between man and his nearest allies" (*The descent*, Volume I: 200), Darwin imagined that:

At some future period...the civilized races of man will almost certainly exterminate and replace throughout the world the savage races. At the same time the anthropomorphous apes... will no doubt be exterminated. The break will then be rendered wider, for it will intervene between man in a more civilized state, as we may hope, than the Caucasian, and some ape as low as a baboon, instead of as at present the negro or Australian and the gorilla (*The descent*, Volume I: 201).

The voyage through the Strait of Magellan in 1834 and his encounter with the Fuegians appears to have made a particularly deep impression on Darwin's thinking on the these matters.

The observations stand in stark contrast to the published accounts of the European colonizers of the Americas 300 years previous to the landfall of the Beagle in Tierra del Fuego (to cite just one example). Even lacking knowledge of modern genetics, simple deduction should have excluded the possibility that any of the peoples of the Americas, from the Caribbean island communities that Christopher Columbus described in his chronicles to the urbanized civilizations of Mesoamerica and the Andes, belonged at any time to different biological classes of human and human precursor, or separate "races." Columbus's description of the inhabitants of the Indies was of highly organized cultures of naturally intelligent men and women, in possession of humanistic values approximating those of Christianity, i.e. dispositions that favored evangelization (Colón 1946[1505], in particular the entries from October 11 - December 28, 1492, pp. 28—115). In 1521, Bernal Díaz del Castillo (1955[1568]: 190-196), in his *Historia verdadera de la conquista de la Nueva España*, marveled at the sight of the imperial metropolis of Tenochtitlan, comparing the bustling central market to the plazas of Salamanca, Constantinople and Rome. Recall that at the same time the Spanish chroniclers following Columbus harbored no sympathy for the indigenous peoples and their "idolatrous"

emergence of musical faculties. Stumpf (2012[1911]), for his part, extended his research on the perception of consonance to argue for another version of the tonality-in-vocal-expression theory: consonant signaling over distances (sustained pitches appear to carry farther) would have served early humans as an effective communicative medium.

One of the first things that we notice in recent discussion on our topic by cognitive scientists is how freely they cross over into speculation, another reason why we should welcome the intervention of musicologists and literary analysts. With relevant direct positive (verifying) and negative (falsifying) evidence seeming to be so remote and inaccessible, any tangible progress appears to be very far off. But current research associated with the interdisciplinary field of biomusicology has been uncovering clues in the cognitive structure of music (i.e., the component knowledge structures and processing mechanisms that comprise musical ability) pointing to indirect evidence that might bear on evolutionary questions. Similarly as in recent speculation about language evolution, hypotheses on music origins are conceptually linked to different theoretical frameworks and actual research findings. For example, modular and nativist approaches tend to favor certain models with functionalist and socio-cultural approaches favoring others. Thinking in evolutionary terms in this way helps to clarify theories of music and language in general, providing new dimensions of comparison and contrast; and sometimes how the sides line up leads to some interesting surprises.

The current proposal that comes closest to the line of thinking that we can roughly trace from Rousseau and Darwin would be the unitary origin-divergence model (Brown 2000, Mithen 2006). Wray and Grace (2007) propose a related holistic protolanguage hypothesis. It implicitly assumes that knowledge structures corresponding to an integrated premusical/prelinguistic antecedent were in the possession, at some level or to some degree, of a

practices, proceeding as soon as was practical to obliterate all evidence of the great urban centers from the face of the Earth. Some of the most important ruins would only be unearthed by archaeologists hundreds of years later. It is possible, but hard to believe, that Darwin was unfamiliar with at least popular versions of these historical accounts and the 19th Century archaeological discoveries of his contemporaries that had brought the objective assessments of the Spanish conquistadores back into public awareness. The contradiction highlights how even the greatest of scientific discoveries in one domain can coexist in the thinking of the same person with eccentric and backward notions in other domains.

common ancestor that early *H. sapiens* shared with other, now extinct, hominid species. In other words, common origin theories, which we could characterize as “continuity” models, also assume gradual emergence of musical (and linguistic) competencies. For example, the precursor of this so-called musilanguage stage would have been a kind of “referential emotive vocalization” system (Brown 2000: 291). Now to be clear, the novelistic account of “music origin” in *Los pasos perdidos* makes no claim about the evolutionary status of the villagers who the protagonist encountered. Novels do not (cannot) make scientific claims; and in fact any reasonable reading of the relevant passages leaves us with only one possible implication: that in the perception of the explorer-musician, the Amazonian community consisted unambiguously of modern humans. Carpentier had no commitment to a theory of music origin that placed it in an epoch prior to the emergence of modern humans; and any suggestion that the “journey back in time” had led to a discovery of primitive archaic pre-modern ancestors would not be a reasonable or coherent reading of the literary encounter. We also understand that in literature one can discover the “origin” of music, of poetry, of narrative, or of anything else, in the manner of a figure; that it would not be a true discovery in the prosaic, or scientific, sense.

The musilanguage model is contrasted to the other logical alternatives by Steven Brown:

- (1) parallel evolution of musical and linguistic faculties, subject to interaction - “binding mechanisms” account for shared properties,
- (2) protolanguage emergence - followed by subsequent outgrowth of music, and
- (3) protomusic emergence - followed by subsequent outgrowth of language.

For the purposes of this review we will consider the musilanguage model to see how far it can take us, for example to see if it is compatible, more or less, with current theories of musical and linguistic cognition. In the end it may not be correct; and selecting it for now should not be taken as indication that it is a consensus view or necessarily the strongest proposal. Rather, its early provenance and continuity (from Darwin) singles it out to be a fitting way to

project new light on a number of long standing debates.

Language evolution and its modern cognitive architecture is the obvious point of comparison. Assuming for now an evolutionary genesis of the core linguistic knowledge structures that underlie language ability, how does musical ability compare to the componential make up of language ability? Did the components of musical cognition emerge as evolutionary adaptations with similarly dedicated and domain-specific knowledge structures? And what evidence is there for a primordial unitary origin? One starting point might be to grant that if the musilanguage model is correct, the arguments of a selective advantage for protolanguage emergence among the ancestors of early humans would also apply to an integrated primitive communication system incorporating protomusical features. Even small incremental upgrades in communicative ability and social cognition (e.g., elementary Theory of Mind) would confer a reproductive upper hand to individuals in new environments where cooperation and interdependence began to take on more importance for survival.

Mithen details the indirect evidence from studies of aphasia and amusia. Findings of double dissociation between musical ability and speech point to a neurological separation, of sets of competencies and processing mechanisms that have diverged and separated one from the other. These findings would also not favor the alternative view that general, non-specific, cognitive competencies underlie all aspects of language and music. At the same time, the existence of common principles and shared properties is taken as support for a unitary origin. The subsystems in language that come together in prosodic competencies are arguably shared with musical cognition; the same networks process contours of melody and prosody in speech. Patients with different combinations of musical and linguistic impairment either perform normally in processing both speech prosody and pitch contour, or fail in both types of task (Mithen 2006: 55–58). At another level, both music and language are generative and are structured “grammatically,” utilizing combinatorial patterns made up of discrete elements to build hierarchical organization (on different tiers, combinatorial patterns within combinatorial patterns).

While the existence of shared domains and common principles might favor a unitary origin hypothesis, the musilanguage model doesn't lead us necessarily to accept that music evolved like language after they diverged, in the same way, with the same kind of network of specialized component parts. If we place unitary holistic communication of the musilinguistic kind as emerging with the immediate ancestors of modern humans this would allow for more than enough evolutionary time for a number of different separation scenarios:

- Music and language are adaptive in the same way, evolving neurological substrates with comparable degrees of modularization and strong dissociation, all along conserving access to circuits that can be exploited in common.
- Language advances much more robustly along componential and modular lines, with musical ability evolving differently in response to strong cultural influences. And clearly, neither "out-growth" model (#2 nor #3 above), with such an early divergence (during the period of the consolidation of a fully formed language faculty among early humans), can be discarded either.
- Non-modular theories would favor the application of general cognitive faculties across all aspects of musical and linguistic ability (e.g., highly encapsulated instinct and reflex-like components served archaic hominids well during their evolution, gradually giving rise to complete integration).

In an interesting chapter in his book *The singing Neanderthals*, entitled "Imitating nature," Mithen addresses the role that mimesis plays in language, and by extension, in music. Returning for a moment to the previous section, recall that this was an important issue in the analysis of *Los pasos perdidos*. It came up in the parting of ways between the musician/protagonist and his mentor, the latter a renowned authority on the evolution of ancient instruments. Given that most linguists would consider imitative behavior a secondary factor in language origins, Carpentier, and Rousseau before him, were on safe ground in dismissing it as the primary force in the emergence of music. But there still might be some loose ends remaining to account for if we

accept their “internal” (non-imitative) origins account.⁵ After all, developmentally, the human imitative capacity is complex and counts among the important domain-general cognitive resources without which language acquisition in children could not proceed. In any case, evolutionary emergence involves additional considerations.

Recalling that musilanguage would have been premusical and prelinguistic, we can admit an important role for mimetic factors at *this* stage or earlier, in effect salvaging Rousseau’s and Carpentier’s notion of a non-imitative origin for music. What they probably had in mind was the birth of a materialized and emergent music competence, fully diverging from its precursor, in fully emerging *H. sapiens*. The integrated musilanguage system would have come to be formed gradually over the long period of early hominid evolution between 1.8 million and 250,000 years ago, “molded by ... interactions with ... [and] communication about animals, plants, rivers, weather and other features of the natural world” (Mithen 2006: 166). It would be inconceivable that archaic pre-sapiens and their predecessors had not made extensive use of imitation and sound symbolism in communication. “Vestiges” of mimesis and iconicity abound in modern language. Mithen describes the precursor of language and music as having been *Holistic, manipulative, multimodal, musical and mimetic* (HmMMMM), serving as a bridge between the limited communicative abilities of the early hominids and true language ability.

As musilanguage/HmMMMM began to differentiate in response to the

⁵ In Chapter 5 of *Los pasos perdidos*, the protagonist concludes definitively that the imitative theory of his mentor is not correct, coinciding with the decision to remain in the rain forest to work on his composition. While his previous academic training had apparently led him astray, the sonorous witness of actual – “magical” even – music creation in the “voz fingida” [feigned voice] of the shaman, allowing him to alternate between pitch heights, generating melody from an extra-musical discourse (p. 204), led the musician to a deeply felt appreciation of verbal art as it gives birth to music. His original error was in carrying too far an analogy between the primitive plastic arts and rhythmic/proto-musical movement (according to the imitative theory, both giving recourse to a representation of the animal over which the author would then exercise power). The singularly impressive scales he was able to distill from the indigenous chants contradicted previous notions of limited pentatonic schema in primitive song. He comes to also appreciate the richness of the oral tradition, in the epic poetry of the indigenous bard who narrated the mythical journey of his tribe: “...en cambio, he encontrado en todas partes la sollicitación inteligente, el motivo de meditación, formas de arte, de poesía, de mitos, más instructivos para comprender al hombre que cientos de libros escritos en las bibliotecas por hombres jactanciosos de conocer al Hombre.” [...in contrast, I have found everywhere intelligent inducement, reason for meditation, forms of art, of poetry, of myth, more instructive for understanding man than hundreds of books written in libraries by men who vaunt their knowledge of Man.]

survival demands of larger and more mobile communities, to serve cooperation and information processing, a diverging language ability began to shed the archaic mimetic features of pre-sapiens communication. In turn, diverging music ability, no longer saddled with the burden of having to express propositional meaning, because the turbo-charged grammatical system of language now sufficed for this purpose, could begin to part with mimetism as well. Musical expression could not serve the new more advanced functions of communication and information processing in any case. Vestiges and common origin fundamentals that need not have receded were conserved. In addition, the continuous interaction over the millennia between the now separate and parallel faculties accounts for the extensive mutual borrowing and the many kinds of genre-specific re-integration in verbal song and poetic discourse. In relation to this idea, the hypothesis to consider would be that the distinguishing property of poetry is musical in nature (specifically, “borrowing” one of the major subcomponents of music). In *Los pasos perdidos*, Carpentier’s musician/protagonist indirectly suggests this possibility as he tries to integrate word and melody in a way that is different from past and current practice in Western music.

4. Is musical ability supported by music-specific cognitive domains?

An alternative proposal for thinking about music evolution contrasts it to language evolution for the purpose of drawing a sharper distinction than the one that has been suggested so far. Language, on this view, could be assumed to be an adaptation; music, in contrast, emerged as a “by-product” of other capabilities, not depending in the end on any core music-specific cognitive structures. But again, assuming an early origin coinciding with the emergence of modern humans, none of the music origin scenarios outlined by Brown are off the table, including musilanguage/Hmmmmm. In addition, if in the end we begin to view as more plausible a model that conceives of music as being shaped by natural selection to a much lesser degree, or not at all even, this does not diminish its importance as a uniquely human capacity, universally accessible to individuals in all cultures. If musical ability turns out not to be a

direct target of natural selection, as is language, by hypothesis (Patel 2008), neither does this put into question the findings of researchers in the field of biomusicology that have identified neurological foundations associated with music-specific brain structures.

One way to begin to reconcile seemingly contradictory positions in the discussion of evolutionary origins and domain-specificity is to stay away from the idea that musical ability is a unitary module or self-contained and encapsulated faculty onto itself (the same idea should be avoided in the study of language ability). As a short hand, we often make reference to the “language faculty” or “musical cognition,” forgetting that abilities are composed of many interconnected knowledge structures and processing mechanisms. Abilities cannot be encompassed by “a module,” but rather are heterogeneous, internally diverse, networks; musical ability would then draw on or recruit from different types of music-related competency and processor. Some might be specialized (specific to musical cognition and performance), others shared with faculties or abilities from non-musical domains, and others completely general. From this point of view it is less than helpful to debate whether “music” or “language” is an evolutionary adaptation. Rather, we could ask if the ability in question is composed in greater or lesser proportion of domain-specific and modular-type competencies and their associated processors. For example, the impairments of amusia are of different types, each one depending on, hypothetically, which subcomponent, shared module, or interface has been compromised and which has been spared. Some cognitive abilities might depend on encapsulated structures of natural selection origin to a greater degree, others less so. Patel, in different terms, presents the argument that language corresponds to the former kind of mental architecture and music to the latter.

Another way to ask the question might be: is there *any* knowledge subcomponent or processing mechanism of musical ability that is music-specific, that at the same time was a target of natural selection? If all music-related competencies and processors are evolutionary by-products (of language, for example), which of them might be, today, modular-like such that they might be susceptible to selective breakdown and show evidence of double

dissociation?

Patel begins by reviewing the evidence for genetically programmed aspects of language development that show the tell-tale signs of being an early evolutionary adaptation:

- Strong critical period effects for first language (L1) development in children.
- Highly predictable and permanent impairments resulting from late learning, not only to the integrity of the language acquisition device but also concomitant deficits beyond in general cognition.
- Evidence of Poverty of Stimulus (PoS) conditions in early acquisition, as in studies of deaf children who far surpass impoverished language input.
- L1 development is precocious and universal, with onset and ultimate attainment remarkably uniform across all cultures, resistant to wide variation of experience (within limits of course).
- Robust cross-modality realization (auditory, visual and tactile), and
- Specific vulnerability to genetic abnormality.

On the music side of the comparison, we should first grant that the corresponding definitive experiments have yet to be conducted and on a number of the above points controversy continues to divide language acquisition specialists as well. Nevertheless, tentative comparisons are instructive as a starting point for considering the question of evolutionary origins. Critical period effects for musical ability have not yet been demonstrated as they have for L1 acquisition so unequivocally, much less for deep-going cognitive deficits as a consequence of acquisition failure. It is important here to keep in mind that questions related to age-related factors for second language learning and “second musical idiom” acquisition/learning should be treated separately from critical period effects *per se*. Regarding early onset and robustness of development, studies have identified specific competencies in young children: sensitivity to tonal patterns, ability to detect “ungrammatical” out-of-key deviations, and ability to sing “in tune.” But these achievements appear slower to emerge and weaker in their breadth and complexity in comparison to the typical receptive and especially expressive linguistic capabilities of the average five-year-old. Nevertheless, even

considering the lower level untutored musical abilities, not to mention advanced abilities that young children exhibit in response to minimal instruction, one could claim that we still have to account for a PoS problem, i.e., complex and abstract knowledge is acquired in the absence of sufficient relevant experience. On the other hand, even the most basic musical performance abilities appear to vary widely among normally developing individuals (unlike in the linguistic domain), suggesting a less severe PoS problem. The research approach overall is to ask whether predispositions in early childhood are innately given and whether they are specific to the domain of music. In concluding his extensive review of the literature, Patel proposes for further investigation one subcomponent of musical ability that seems to stand out from all the others; evidence points to a evolutionary modification specific to music in the area of beat-based rhythm processing (Patel 2008: 355—412).

Regarding specificity, as we hinted at earlier, the existence of shared domains that underlie intonation and melodic contour as well as other possible “by-product” structures may simply push back the selective advantage question to a period of pre-sapiens evolution before the (hypothetical) separation of protomusic and protolanguage. The idea then would be that after this period language became the most direct (or only) target of natural selection. And returning to the “multicomponent” approach that is being favored in this review, each relevant domain, whether it is shared, or is a language by-product, or is music-specific, is likely to have a different evolutionary history. From this point of view, understanding the biology of human music should stand to benefit from the study of both homologous and analogous systems in other animals (Fitch 2006).

5. Evolution of linguistic competencies

The same research opportunities regarding homologous or analogous systems of expression and communication in general present themselves in the study of language origins; and as we have seen already, in delving far into the evolutionary past research questions about language origin are hard to disentangle from those of music origin. One approach that shows promise is to

view language not as a sudden innovation, not a new and distinct faculty through and through, but as Fisher and Marcus propose as: “a complex reconfiguration of ancestral systems that have been adapted in evolutionarily novel ways.” From this perspective, linguistic competencies evolved as a product of “descent with modification” (Fisher and Marcus 2006). Vocal learning (different from innately specified calls) has appeared only a few times in the vertebrate line, three bird species and three groups of mammals, one of which is humans. Together, these cases only pose the issue of convergent or independent evolution (analogy); but recent studies from different fields have shown interesting parallels involving comparable genetic pathways and neurological mechanisms, similar behavioral capabilities and constraints that are hard to ignore (Fitch 2006, Fisher and Marcus 2006).

Returning to possible precursors of language among our hominid ancestors (different, but related, to the question of the analogues of vocal learning just mentioned), the first problem turns on what kind of system protolanguage might have consisted of. Recall from the previous section that there are two logical possibilities of a general framework for this stage of evolution:

- an early integrated protolanguage/protomusical ability (musilanguage/Hmmmmm), and
- an independent and parallel-evolving protolanguage (parallel to protomusic).

Then we could ask what factors and mechanisms might have intervened in the transition to a fully formed and independent linguistic system. First on the kind of system that constituted protolanguage, was it:

- holistic (multi-segment formulaic holophrastic utterances that subsequently underwent segmentation - the extraction of individual morphemes) or
- synthetic (emergence of single-symbol syllable-length utterances, then later combining to form simple ordering patterns)?

It would appear, tentatively, that a *holistic protolanguage* would be consistent with the musilanguage/Hmmmmm theory of Brown and Mithen, while a *synthetic protolanguage* would be more in line with models of independent

parallel development of language and music, #1, or one of the “outgrowth” models, #2 and #3, in Section 3.

Perhaps there are a number of different ways of conceiving of a basic communication system used by prelinguistic ancient hominids that integrated music-like and language-like features. In any case, as a precursor to the linguistic grammar that arose with *H. sapiens*, the idea of an elaborate and stable holistic protolanguage has been questioned by Tallerman (2007), who raises a number of interesting considerations:

- A stable holistic protolanguage implicitly accepts as a given that an advanced phonological competence would already have been in place. This kind of linguistic knowledge would be necessary for reliable decomposition of multi-segment formulas.
- During a long holistic protolanguage period, sound patterns would have been in constant fluctuation and the morpheme-to-be segments would not have maintained consistent positions in the unstructured unitary utterances, imposing a severe, probably insurmountable, processing burden on the limited capacity of erectus-era learners.
- With nothing like an integral Universal Grammar (UG) to guide acquisition, a scenario in which our distant ancestors arrived at common meanings for the complex ever-shifting phrase-utterances and in which they were able to analyze them into word-like segments appears to assume too much.

The idea of a synthetic protolanguage could begin with the widely accepted assumption that the socially adept common ancestors that modern humans share with extinct evolutionary cousins, such as *H. neanderthalensis* and *H. erectus*, had in place a rich conceptual structure, including the scaffolding of an incipient Theory of Mind capability. The voluntary use of discrete symbolic vocalizations and gestures, but still not systematically combinable, conceivably could mark a first stage surpassing involuntary alarm calls and the like. What we describe as an “incremental specializations” hypothesis (Jackendoff 2002, Pinker and Jackendoff 2005, Newmeyer 2002) – broadly compatible with the componential method of Patel in contrasting music and language, and Fisher and Marcus’ descent with modification concept – addresses the second

problem: the transition to language with a complete grammar. For an opposing view to “gradualist” theories of language (and possibly music) evolution, see Bickerton (2000).

It also proposes a resolution to the apparent paradox of evolutionary continuity and discontinuity mentioned earlier: that a fully formed Faculty of Language (FL) and Universal Grammar are unlikely to have sprung forth in a sudden and all-inclusive event, endowing *H. sapiens* with a modern linguistic system and negating any approximation toward it to their precursors. Employing the metaphor of “linguistic fossils,” the study of modern-day pidgins and other types of protolinguistic competence, exemplified in early “fossilized” learner languages, provides clues to how UG, and FL more broadly, evolved. This perspective then dispenses with the debate about whether or not archaic hominids “had language.” Early communication systems began to approximate, by increments, a completely formed FL because subcomponents of it came to be targets of natural selection. Similarly today, the different kinds of pidgin that modern humans construct are constrained at least in part by principles of UG (Goldin-Meadow 2007) – i.e., those subcomponents of it that learners have access to under the specific circumstances of language learning that each situation allows.

Advancing beyond the first one-word stage is marked by the growth in the number of “paleo-lexical items” (Jackendoff 2002: 241), giving rise naturally to juxtaposed symbols and sequences organized purely on the basis of meaning and context. Very basic word ordering patterns coalesce around the order of semantic roles and pragmatic information, such as Agent first-Focus last. Phrase structure, the more abstract lexical categories of noun and verb, and grammatical relations of subject and object follow upon the need to express and understand more complex propositions. Evidence that these last two stages (one-word stage and basic grammar stage) are independent of each other to some degree is in the observation of modern language development; that certain aspects of lexical knowledge and syntax do not always develop inseparably, especially in exceptional (e.g., impaired) circumstances of language learning. Thus, we can point to hypothetical reproductive advantages in enhanced communication, advances in making semantic relations more

explicit, and more efficient processing of information in comprehension and thought, even for small increments in these capabilities. Chances of survival to maturity were improved for those individuals who found themselves able to deploy these communicative abilities and learning and reasoning strategies (boosted by language use), perhaps only marginally. But over the long term, along that margin, a selective edge would take effect and favor these abilities and cognitive strategies. In the end, according to Pinker and Jackendoff, linguistic competence, together with its associated information processing mechanisms, displays signs of complex adaptive design, in the same way that other biological systems do.

Looking back at this point in the discussion to the original idea of an integrated musilanguage stage in evolution prompts us to consider alternatives that provisionally accept a prolonged independent protolanguage emergence:

- in Section 3, the separate and parallel model #1, as before,
- one of the outgrowth models #2 or #3, but now perhaps with the branching off of musical or linguistic faculties occurring much earlier to accommodate an autonomous and self-contained protolanguage stage, and finally
- also push back much further a hypothesized musilanguage, appearing now as a precursor to protolanguage itself.

On the related natural selection question in the comparison between music and language, we appear now to be gravitating toward Patel's position: stronger evidence for linguistic competencies as adaptations, with music-related competencies as evolutionary by-products. Recall that this view does not necessarily deny the emergence of music-specific cognitive domains.

6. Humanities-science dialogue

Returning to the proposal that introduced this essay, one conclusion that we can draw from the review of music origin theories is that the exploration of human nature by literature, art and science can find substantial points of contact of great mutual benefit. For one, it would help resurrect a long-standing concern by literary scholars, musicologists and writers for universal themes

and formal structures that are shared cross-culturally (Pinker 2007, Carroll 2006), in disfavor in many quarters today under the widespread influence of radical social constructivism. The possibility that musical ability, for example, might be based on species-specific foundations (part of our shared human nature) led some field researchers to question what to them seemed like unfounded distinctions, such as between so-called “ethnic music” and published “art” music. Not that there are no distinctions; but rather that much ethnomusicological research had taken observed differences too far. In the emphasis on (seemingly unlimited and unconstrained) variation, the possibility of studying cross-cultural universals, for many, had come to be seen as futile. The critiques of Blacking (1989) were one example of this questioning. The idea of “species-specific foundations” is related to the proposal that: “[the] invention of music is part of the process of biological evolution, ..., evolution in the Darwinian sense” (Blacking 1987: 22).

In all this, Carpentier’s work stands out perhaps because he was able to approach the aesthetic problems at hand as both creator and analyst of artistic creation.⁶ Great liberty was taken in this discussion in associating the metaphor for music origins in his early novels with the musilanguage model, whose fortunes we saw rise and fall. Regarding the metaphor, it is important to emphasize one last time that it took the form of a reflection born of literary creation (his own), not a precisely formulated scientific hypothesis, based on evidence gathered. It is also evident that no decisive disconfirming finding from research has come forward to prompt us to disfavor all possible versions of the

⁶ The last two chapters of *Los pasos perdidos* are devoted in large part to the musician/composer’s thinking about how he will conceive and give structure to the *Treno*, the work that will incorporate the insights gathered from understanding the fundamentals of music (as witnessed in the history of music in its earlier epochs as the journey unfolded and in its hypothetical origin). For him, nothing less than a (personal/inspirational) “reinvention of music,” unfolding in a “linear simplicity” (p. 218–219), in the passage from word to song-melody, was at stake. This speculation starts with an assessment of the recourse of recitative, the problem of how song can be coupled to language (in particular, the expression of meaning while adopting the rhythm of ordinary speech – most familiar to modern listeners in opera), then considering the difficulty and tension that such a coupling involves. His idea, drawn from the music genesis shared with him by his Piara hosts in traditional lamentation, was that in the *Treno* song would emerge seamlessly from speech, the poem becoming music, finding its melodic contour in the prosody of the verse (p. 217). The modification of speech for aesthetic purpose – to become poetic and then musical – can be achieved, for example, when the voice shows strong emotion, as in sorrow. Such would be the opportunity for introducing melismatic features into the verse patterns in transition toward fully formed musical patterns (p. 222). The text of the cantata, he decided, would come from the *Odyssey*.

musilanguage model. Recall that in the previous section the possibility was left open of a distantly archaic mimetic vocal communication system that would have relied heavily on prosodic and paralinguistic resources, suggesting, as it also does, hypotheses about the origin of poetry. And in general, given the highly provisional nature of proposals from all sides (for good reason), approximations that avoid attempting narrow precision will serve future work on these problems much better.

This tentative assessment leads us to consider the difficult question that has been deferred up until now: in what precisely does the contribution of the humanities to scientific research consist, and on which points of contact might convergent dialogue come to be most productive? In the example we have before us, the figures of music genesis as they were presented in the fictional account of music encounter in *Los pasos perdidos* helped to outline logical alternatives and plausible scenarios. Because, in this case, the literary presentation appealed to possible *natural explanations*, its speculations clearly form an integral part of the previous philosophical inquiry on this subject (dating back to Rousseau). This inquiry and speculation are still important for understanding human cognition, the origins of creative capacity in particular. In the end, the novelist/musicologist's metaphor may turn out to be misleading, compelling us to backtrack along the path taken in the previous pages. But it is also clear to see how it has contributed to framing discussions in literary studies and musicology today. Having a path to retrace can be of great value.

At the same time, while it is important to appreciate how far the humanities-science exchange reaches, it would be a mistake to blur crucial distinctions. For example, concepts, accounts and proposals drawn from literature are not a source of data; they do not provide evidence, not even of the positive confirming kind, much less negative and falsifying evidence. Topics for future discussion are then posed: how is it that non-scientific work in the humanities has been able to make the contributions that it has made, historically over the centuries and up to the present day? The analogy that may help answer these questions takes us back to the shared domains of music and language – one of the points, as we saw, around which there is broad consensus. On another level, whatever it is that literature and science

might share or converge on suggests that we should look back to their historical and evolutionary origins as well. Historically, we can look back to the Age of the Enlightenment to find the beginnings of the modern common ground that science and the humanities share - a common cultural inheritance. The hypothesis that has been presented for consideration in this article is that, in evolutionary time, there might have been a remote common ground - of a very different kind - that came to form part of our biological inheritance.

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