Of Evolution and Memory: Theorizing a Biocultural Framework of Memory

Paul J. P. Sandul
Stephen F. Austin State University

ABSTRACT

The purpose of this paper is to integrate evolutionary and cultural theories to design a biocultural framework of memory that can provide new understandings about the nature of historical remembrances and representations. The assertion is that deep, evolutionary reasons can help account for the manifestation of historical remembrances and representations across diverse societies. Specifically, a biocultural framework of memory contends that historical remembrances and representations can be interpreted as evolved human traits. They aid fitness of individuals living within groups by enhancing cohesion and cooperation. Representations of the past can also expand the definition of in-groups through their ability to evoke empathy, solidarity, identity, and understanding. They can also, in evolutionary terms, maximize fitness and bequeath group members with survival advantages.

Keywords: *memory, evolution, social solidarity, historical consciousness, theory.*

INTRODUCTION

Perhaps impossible but this article is an attempt to blend sections of Charles Darwin's so-called dangerous idea with Foucauldian regimes of truth. I mention video games too. The purpose is to integrate evolutionary and cultural memory theories to design a biocultural framework of memory. Such a framework can provide new understandings about the nature of historical remembrances and representations of the past. Granting that the past works in society and culture in ways that we are all still trying to grasp, my assertion is that deep evolutionary

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reasons can help account for the manifestation of historical remembrances and representations across diverse societies. A biocultural framework of memory contends that historical remembrances and representations can be interpreted as evolved human traits, especially when they are placed within the broader rubric of human culture. They aid fitness of individuals living within groups (the *in-group*) by enhancing cohesion and cooperation. Representations of the past can also expand the definition of in-groups through their ability to evoke empathy, solidarity, identity, and understanding. They can also, in evolutionary terms, maximize fitness and bequeath group members with survival advantages. The results, however, can be injurious to out-groups or even marginalized in-group members and undermine in-group efforts at building cohesion.

This article is divided into three sections. I first make clear my approach to memory as I define relevant terms and concepts. Yet, because I assume most readers of this journal are somewhat familiar with memory studies, this section runs shorter than the following section on evolution. The bulk of the paper is a literature review as a result. By the time I finish the section on evolutionary studies, terminology, and theories, however, I conclude with a final section in which I present a biocultural framework of memory relatively quickly, precisely because relevant theories and terms were already fleshed out. Admitting that mixing theories from evolution and memory studies is difficult I ultimately needed to pick my battles. Too much time on too many terms and concepts – especially on memory studies – would explode the article and bury my argument. I see this article as merely introducing a biocultural framework as a general concept, awaiting others to add to, delete, tweak, or alter, but hopefully not dismiss.

I. COMING TO TERMS WITH MEMORY

As a cultural historian I approach memory from the humanities. I mostly accept the postmodernist view that sees *representations* of the past (memory broadly conceived), particularly history (White 1973), as inherently narrative and imaginative constructions – that is, whether fact or fiction, history is not just about a subject but the representation and rendition of that subject for particular reasons to create certain meanings (Munslow 2007; White 1973). Memory studies and the idea of memory actually encompasses many phenomena, from Maurice Halbwachs's (1992 [1925]) foundational conception of collective memory to others about cultural, historical, and political memory, invented tradition, and national, public, and social memory, among oth-

er terms and concepts about how the past functions in society (for reviews, see Bernecker and Michaelian 2017; Erll and Nünning 2010: 1–15; Olick *et al.* 2011: 3–62).

I have narrowed on social and cultural reconstructions of the past in my research, which I have linked to *cultural memory*. I have been interested in the ways that sociocultural and political-economic contexts affect historical remembrances and representations. The idea is that social relationships and phenomena – culture, ideology, beliefs, and even the state and other institutions – all (potentially) affect our remembrance of the past and, in turn, such remembrances have an affect (potentially) on broader culture and society (for other reviews/definitions of cultural memory, see Assmann 2010; Erll and Nünning 2010: 1–15). Of particular importance here is what Michel Foucault called *regimes of truth* (Foucault 1980: 131–33). Foucault explained that a regime of truth reflected a structure and assembly of power that establishes, defines, and disseminates truth and knowledge (similar to Antonio Gramsci's theory of cultural hegemony [1971]). Foucault further argued that such hegemonic regimes also help construct what he labeled *dominant memory*: conceptions of the past that acquire dominance in public representations (Foucault 1977: 144–50). A recent example in my home state of Texas and the American South is Confederate/Civil War memory. Confederate memory, as numerous scholars point out, is (and always has been) about white American identity and white American supremacy (Blight 2001; Brundage 2005). Wrote the African American public intellectual Ta-Nehisi Coates, 'The Civil War is a story for white people – acted out by white people, on white people's terms' (Coates 2011: 145). Such stories forego an honest representation of the past in favor of a dominant memory that celebrates the Civil War within a framework of the so-called Lost Cause (*i.e.*, the Confederate cause was a heroic one against a despotic, tyrannical federal government) that is meant to romanticize white ways of seeing the past. Originally advanced by Southern whites at the turn of the twentieth century they acted as a hegemonic regime of truth who simultaneously downplayed the horrific realties of slavery and its centrality in causing the Civil War, the long history of white violence against African Americans, and the lives and accomplishments of African Americans.

Regimes of truth do not just magically establish a dominant narrative however (and, note, a dominant memory need not always be as maladaptive as the Lost Cause example). Rather, dominant memory is an accomplishment and is the result of numerous and various repre-

sentations of the past over time; what I label *memory works* (similar to what Samuel called *theatres of memory* [2012] or Russo as *vectors of memory* [1991]). The immense range of the historical is a key point and includes any number of objects or representations subject to interpretation, such as history books and journal articles, but also television, film, photographs, the internet, video games, oral histories, academic disciplines and branches of knowledge, local historical societies, museums, art, architecture, pageantry, bodily gestures, monuments, memorials, historic preservation, and commemorations (see similar approaches within memory studies in Anderson 1983; Connerton 1989; Glassberg 2001; Goody 1998; Hirsch 1997; Hobsbawm and Ranger 1983; Russo 1991; Samuel 2012; Walkowitz and Knauer 2004; Wertsch 2002). Dominant memory is ultimately articulated in and through such memory works and (while counter, non-hegemonic memories can certainly exist) they tend to direct people to remember the past in certain ways that, in turn, reify dominant memory.

This repeated reconstruction of dominant memory might surprise some. Scholars have long pointed out counter-memory to dominant memory (*e.g.*, Foucault 1977: 113–98) but dominant memory has staying power. This connects to what James Young called *collected memory* (1993: xi) whereby the representations first provided by hegemonic regimes became the resources of others, whose memory works then became the resources of others, and so on (for similar views, see Hobsbawm and Ranger 1983: 1; Hirsch 1997: 22). Said differently, dominant memory does not always result from people lacking creativity or critical thinking. It often results from other ways of representing the past seeming nearly impossible to do outside the ways already used.

Memory – whether dominant, collected, counter, or otherwise – also has more personal and functional uses. Key here is David Glassberg's *sense of history* in which he defined historical consciousness as developing at the intersection of the intimate and the historical – the way past events of a personal and public nature are intertwined (Glassberg 2001: 6). When considering the public nature as an ingredient in shaping historical consciousness then dominant, collected memory (or memory broadly, including counter-memory) seems a legitimate one when analyzing historical consciousness. Is short, people desire history, especially as it concerns the past of their locales, regions, religious institutions, and even group-based identities (*e.g.*, sexuality, race, nationality, *etc.*) (Rosenzweig and Thelen 1998; Davison 2009: 80–109; Kean 2004: 1–15; 60–81). This occurs because individuals not only crave history but also because history can offer them a usea-

ble past (Zamora 1998) – a narrative of events and actors that can be harnessed for some purpose in the present. Some of the more common reasons cited by scholars for developing a useable past has to do with individual and collective identity (Wertsch 2002: 31). Specifically, conceding history is an inherently constructed narrative (regardless of how factual/accurate) meshes with the view of narrative generally as central to human consciousness – as something that greatly shapes the way we think, speak, and behave (Bruner 1986; Hutto 2007; MacIntyre 1984; White 1987; Young 1988). Human beings therefore function similar to Claude Lévi-Strauss's notion of the *bricoleur*[1] (1966: 16–33) by gathering the narratives they use to shape identity from a stock of stories (Wertsch 2002: 57) that pervade and characterize their sociocultural setting. Identity (a sense of self) must be conceptualized as it develops in such sociocultural settings (Holland *et al.* 1998: 5) and includes the engagement, reproduction, and reassembling of memory works (Assmann 1997: 15; Connerton 1989: 21; Lowenthal 1994; Straub 2006).

Scholars have also argued that 'one of the important functions of memory' is that it has 'a remarkable capacity to create a sense of unity or "oneness" among people who would not otherwise see a meaningful sense of kinship' (Lambert *et al*. 2009: 194–95). Many scholars have thus analyzed memory at the group level to highlight the role it can play in helping fashion a shared vision of the past to unite group members (*e.g*., Assmann 1995; Glassberg 2001; Kammen 1991; Lowenthal 1994; Walkowitz and Knauer 2004). The goal is to create a shared likeness among differing, complicated, even selfish individuals so that the group in which they live is united and stable (Kammen 1991: 3); akin to what Benedict Anderson labeled *imagined community* (Anderson 1983: 1–5).

I have tried to concisely define terms most germane to my approach to memory and that inform my conceptualization of a biocultural framework of memory. Underscoring my understanding of cultural memory is a hegemonic regime of truth working to fashion narrative stories and representations that subsequently form the basis for the creation of dominant memory, which is defined by – and comprised of – various memory works that later generations inherit as collected memory, then repeat it and, in doing so, perpetuate and legitimate dominant memory. Dominant memory also functions as a contributing force in molding historical consciousness as well as serving as a basis for the formation of both personal and group identity. The next section

is a review of evolutionary terms and concepts that are most relevant to my conceptualization of a biocultural framework of memory.

II. COMING TO TERMS WITH EVOLUTION

My first consideration of evolution with memory came with Steven Pinker's *The Blank Slate: The Modern Denial of Human Nature* (2002). I asked whether history or cultural memory could be *adaptations* or *traits* of an organism that had been shaped by some *selective force* such that they enhanced survival and success odds (*fitness*) of their possessors and rooted in our phylogenic (evolutionary) history (defining these and more evolutionary terms occur below). Pinker's subtitle triggered the idea (*i.e*., 'human nature'). A review of the many theories of human nature is beyond my scope but Pinker's commentary on the effects thereof is what truly resounded: the seeming universality of certain human behaviors.[2] As I engaged more literature about evolution I came across similar assertions about the existence of universals or, if not universals, *species-typical behaviors* (*i.e*., certain behavioral similarities that are shared by almost all members of a species) (Brown 1991). Then I encountered Joseph Carroll's *Reading Human Nature* (2011). While neither the first nor the only to argue such (*e.g*., Boyd 2009; Boyd *et al*. 2010; Dissanayake 2000; Donald 1991; Gottschall and Wilson 2005; Mesoudi 2011; Richerson and Boyd 2005; Sperber 1996) Carroll impressed me with his conception of how literature and the arts possessed *adaptive significance*. Not entirely succumbing to the postmodernist view that all history was bourgeois fiction I proceeded to view representations of the past similarly to how Carroll viewed literature and the arts broadly: that they had an *adaptive function*; or at least a significance that had evolved.

Inspired by evolutionary psychology (*i.e*., 'the study of the phylogenetic and adaptive functions of the mind' [Pinker 2002: 51; see also Buss 2004; Dunbar *et al*. 2009]) literary scholars Boyd *et al*. asserted, '*Homo sapiens* is a strangely artistic ape' (2010: 11). The production and consumption of narratives constituted uniquely human, '"species-typical" or "universal" characteristics' (2010: 11; see Hutto 2007: 1–16 for a view contesting the evolutionary roots of narrative's origins). The idea is that human culture – from language to abstraction, symbolism, morals, customs, art, law, social relationships, racial categorizations, gender roles, sexuality, *etc.* – springs from and contributes to evolved minds. Narratives and representations manifest globally and across radically differing cultures. Humans 'use narrative to explain how things came to be and to tell stories' (Brown 1991: 132; see also

Dissanayake 2000: 94). For example, stories can provide certain kinds of knowledge and potentially bequeath humans with survival advantages, such as keeping track of records, surveilling others, regulating interactions and society, establishing and enforcing norms, coordination, sharing knowledge, planning, making decisions, and spreading myths.

As cognitive neuroscientist, psychologist, and nueroanthropologist Merlin Donald also explained, stories – particularly 'myths of creation and death, and stories that serve to encapsulate tribally held ideas of origin and world structure' – indicate attempts to make sense and impose order (1991: 213). Representations and narratives tie to human cognitive development and need for identifying *causality* – for example, life/death, pleasure/pain, rain/shine, naughty/nice. Causal explanations center on group feelings about the position of the group in both time and space, offering strong use-value for prediction (trajectory), regulation (control), and cooperation (bonding) (Dissanayake 2000; Donald 1991; Pinker 2002; Gottschall and Wilson 2005). Storytelling is key. According to Donald it allowed for conceptual models of the universe as good at binding individuals together and fostering cooperation in competitive landscapes (1991: 257).

Donald, Carroll, Pinker, and others referenced enthralled me so enormously because they greatly echoed what I – as a cultural historian – had been reading. I returned to scholars such as White (1973) and Munslow (2007) who had argued history was essentially narrative (see also Bruner 1996; MacIntyre 1984; and Wertsch 2002). These connections concerning both narrative broadly and history specifically is what finally inspired me to pursue a biocultural framework of memory and to attempt to theorize why constructing narrative stories and representations about the past might have an adaptive significance and/or function, traced back deeply within our phylogenic history.

Why and how memory arose within an evolutionary framework needs clarification of course. Many terms, processes, and more permeate evolutionary studies and our modern understanding of evolution. Yet, since my goal is to make a run at a biocultural framework of memory, I only provide a broad overview of some of the main ideas within evolution and related fields, especially those that take into account culture. To start, *evolution* 'refers to change through time as species become modified and diverge to produce multiple descendant species' (Losos 2017: 3). While evolution and *natural selection* are often conflated, 'evolution is the historical occurrence of change, and natural selection is one mechanism' (Losos 2017: 3). Natural selection

for Darwin meant the 'process in which individuals with a particular trait tend to leave more offspring in the next generation than do individuals with a different trait' (Losos 2017: 3). Natural selection, however, is just one of many mechanisms or *selective forces* that influence how many organisms live and die.

Selective forces are generally about producing *adaptations*: 'inherited trait[s] that makes an organism more fit in its ... environment' (Bergstrom and Dugatkin 2012: 72). A trait (or even a *phenotype*[3]) can broadly refer to any one of a variety of characteristics, behaviors, or conditions but some scholars (discussed below) have argued that many human traits may have indeed adaptively evolved by natural selection but particular traits might also actually represent *exaptation* (*i.e*., the process by which a feature evolved for one purpose gradually becomes used for another function [Gould and Vrba 1982]) or may have otherwise evolved for non-adaptive reasons (*e.g*., *mutation* or *genetic drift*) (Losos 2017: 9) or causes (Lewontin 1983). I thusly narrowed on traits – what they were, how they could function to maximize (or not) fitness, and to identify factors that could trigger or otherwise influence a particular trait to evolve, manifest, or serve important functions.

Inquiry into traits led down the complex road of genetic and molecular studies that focus on the acquisition of traits genetically transmitted from parents to offspring (Bergstrom and Dugatkin 2012: 18). Within natural selection traits that are associated with increased fitness gain in frequency and are inherited by the subsequent generation and, if 'continued over many generations, such selection can greatly change the constitution of a population' (Losos 2017: 4). Here *inherited* (or *inheritance*) is key. This refers to the regeneration of traits and processes through direct or indirect transmission. Typical within a Darwinian framework is *vertical transmission*: information transferred from parents to children. Second, *horizontal transmission* occurs between peer members. Third, *oblique transmission* happens between unrelated members of any cohort, such as teachers to pupils (Dunbar *et al*. 2009: 142). Horizontal and oblique transmission ultimately provide a bridge to theories concerning *cultural evolution*[4] and nongenetic forms of inheritance; or at least the role of cultural transmission and even social, cultural, and other theories of learning – that human evolution did, in fact, account for and include culture.[5]

Works by Pinker, Donald, Carroll, Boyd, and others about evolutionary psychology (Buss 1994; Dunbar *et al*. 2009) allow us to see culture, along with biology, as both a product of evolution and some-

thing that could influence evolution (the *Dual Inheritance Theory*).[6] The argument is that by not accounting for culture we betray evolutionary fundamentals, which do address the relationships that exist in *interactions* between humans and the environment – even cultural context – and the costs/consequences on adaptations. Important here are theories about cultural evolution as well as *gene-culture coevolution*. Cultural changes bring about alterations to the environment and such changes affect how genes act in *development* (*i.e*., the generalized process by which humans grow and develop – their *ontogeny*) and what selection pressures act on genes. Dairy farming, for instance, thought to have arisen about 6,000 to 8,000 years ago, 'appears to have created a selective environment that facilitated the proliferation of lactose tolerance in those populations where it was practiced' (Hannon and Lewins 2017: 795).

Interactions, such as with gene-culture coevolution, is an attempt to look beyond 'gene-centrism' (Smith 1994) to the extended nongenetic selective forces played by human ontogeny, society, culture, and environments, not to mention, for example, phenotypic plasticity (*i.e*., 'the capacity for nongenetic, advantageous modifications of the phenotype' for coping with changing environments [Futuyma 2017: 191]). Ecological forces, simply put, are active in evolution. Genes and their expression take place within individuals residing in, interacting with, and developing within societies, cultures, and environments. So Odling-Smee *et al*. advanced *Niche Construction Theory* (NCT) to incorporate culture into evolutionary understanding. They hold that people do not passively occupy ecological (*i.e*., environmental, material, societal, and cultural) niches but rather are embedded in them and, further, actively modify them. Niche modification, in short, changes evolutionary selection pressures (Odling-Smee *et al*. 2003).

Much of the discussion concerning traits and culture deals with the adaptation of human cognition and language. The central thrust is that our brains are influenced and molded by evolution.[7] For example, while competing theories abound,[8] in *Origins of the Modern Mind* (Donald 1991), a work citied by memory scholars (*e.g*., Olick *et al*. 2011: 325–33), Merlin Donald divides the evolution of human cognition into three stages: (1) *Homo erectus'* mimicry; (2) *Homo sapiens'* speech and narrative ability; and (3) *Homo sapiens sapiens'* (modern humans') non-biological, external memory 'hardware.' Donald focuses on alterations to the architecture of human memory – specifically, capacity and skill expansion – thus making symbolic representations, higher thinking, and the capacity for culture possible, as well as

demonstrating how cognition influences culture and vice versa. Cultural transmission, learning, and change all take place via humans accessing 'external memory media,' what he calls *exogram*s (which mirror Jan Assmann's prominent definition of cultural memory as 'exteriorized, objectified, and stored away in symbolic forms' [2010: 110]). *Exograms*, opposite *engrams* (human biological memory), are external sources and storages of information and representation. Exograms are therefore adaptive traits that function concurrently in a network with human higher intelligence and a wealth of symbols and information too vast for anyone to retain or master. The modern human brain structurally altered not to expand storage or recall in this case but rather to develop and learn tactics for accession and retrieval. This portends endless possibilities for interpretation that takes shape within (developing) individual minds strategically navigating sociocultural niches.

Natural selection alone, as Terrence Deacon and others who discuss *relaxed selection* often argue, is not a sufficient explanation for our supreme mental and behavioral capabilities (Deacon 2009, 2010; Lahti *et al*. 2009). Relaxed selection refers to 'the weakening or removal of a source of selection that had been important in the maintenance of one or more traits' (Lahti *et al*. 2009: 1; Deacon 2009, 2010). Environmental change can often eliminate or weaken a source of selection that was formerly important for the maintenance of a particular trait (Deacon 2009, 2010; Lahti *et al*. 2009).[9] A trait is also often the result of more than one mechanism or selective force, therefore weakening or removing one essentially subtracts – or reduces the magnitude of – just one mechanism/force among several. This change has potential redistribution effects and can open up new synergistic interactions, relationships, and possibilities, including forces or information that previously were too weak to have an influence, such as sociocultural ones (Deacon 2009). The removal/weakening of a previous influence on a trait can also increase the probability of a trait losing its contribution to fitness and, consequently, lead to an increased probability of trait loss whereby its expression may reduce or even disappear. In the move from land to sea, for example, whales saw their front legs modify into flippers while they also lost their hind legs. The trait also might still persist, however, because it is maintained by remaining influences and/or selective forces, either for the same or different function (*i.e*., it can, again, be modified or even exapted, *e.g*., wings for flying become wings for swimming [penguins] or paddling [ducks]).

Relaxed selection opens the door again to contextual influences, such as sociocultural ones (Deacon 2009: 746). This is precisely because relaxed selection takes place within ecological niches and because what was once involved in sparking and maintaining a trait shifted/offloaded from an innate localized mechanism and/or function onto a more distributed array of systems such as culture.[10] This redistribution effect, Deacon argues, is what opens new synergistic possibilities, interactions, and combinations that could, for instance, help explain the evolution of human language, cognition, and culture without necessarily favoring a Darwinian adaptationist framework (Deacon 2009; 2010). Moreover, a newly acquired, modified, weakened, or even lost trait can further relax the effects of other selective forces and influences (*i.e*., the Baldwin effect [see Deacon 2003]), opening up a cascade of yet evermore new synergistic possibilities and changes.

Correlating with relaxed selection is a 'recent resurgence of interest in the contribution of epigenetic processes on the course of evolutionary change, popularly known as evodevo' (Deacon 2009: 730). *Evodevo* refers to the combining of evolutionary and developmental biology, psychology, and neuroscience to emphasize how evolutionary design was 'built over evolutionary time by selective demands and developmental dynamics' (Lende and Downey 2012: 7). Relaxed selection is not always about loss (*e.g*., the loss of a selective force's influence or a trait's antecedent function and/or expression) but about exciting potentiality for the creation of something new and/or different (*e.g*., human language).

Epigenetics is the study of changes in organisms brought about by modification in gene expression (*i.e*., the process by which genetic instructions are used to combine and synthesize gene products such as RNA and protein) rather than by alteration of the genetic code in the form of DNA (Carey 2012: 13–15). The term (not concept) dates back to at least the 1950s to describe the way genes interact with the environment to produce specific phenotypes/traits (Carey 2012: 23–26). Your experiences and development, largely structured by your ecological niche, affect you and have innumerable consequences. This includes genetic transcription and expression responding to the reality of your life. Experience therefore factors into the regulation of gene expression, which in turn can affect other genes that can then factor into trait persistence, modification, loss, or genesis.

An 'epigenetic perspective' embraces 'all contributions to individual development, from the molecular to the social' (Blumberg *et al*. 2010: 1) – all that potentially goes into the regulation and modifica-

tion of gene expression, and this can play a role in evolution. There is hence nothing inconsequential about life experience and development (Lickliter and Honeycutt 2010: 36): the who, what, when, where, and circumstances of our births, upbringings, relationships, the opportunities or constraints afforded, and the broader political, economic, social, and cultural institutions and frameworks structuring our lives. Such things can affect your very composition.

Epigenetics has also led to controversial questions that bring back into light an old and often obviated figure in evolutionary studies: Jean-Baptiste Lamarck (1744–1829). Lamarck famously argued for the heritability of acquired characteristics. Applied to epigenetics, however, and the question narrows on whether ecological effects that can affect the regulation of gene expression and traits have to happen anew in each generation. Could they be passed down from one generation (who acquired it) to the next? As Robert Lickliter and Hunter Honeycutt explain, 'there is now considerable evidence that parents transfer to offspring a variety of nongentic factors in reproduction that can directly influence phenotypic outcomes, including DNA methylation patterns, other chromatin marking systems, RNA interference, cytoplasmic chemical gradients, and a range of sensory stimulation necessary for development' (2010: 38). Since the environment can factor into epigenetic change and modification, epigenetic information 'can be transferred through a number of mechanisms ... *and the effects may persist for generations*' (Tollefsbol 2014: xiii, emphasis added; see also Jablonka and Lamb 1999). This view of *transgenerational epigenetics* lacks consensus but it points yet again to the potentially profound role of extrinsic contextual influences throughout both ontogeny (development) and phylogeny (evolution).

One major idea in the study of epigenetics has been *Developmental Systems Theory* (DST). Part of the evodevo revolution and related to NCT in many respects, DST also champions the notion of multiple causes for the genesis, maintenance, persistence, modification, and loss of traits and behaviors (including epigenetics). Susan Oyama explains that DST thus 'directs attention to the mutual dependence of effective causes' (1985: 6), meaning that no one source of influence has primary control and it is meaningless to talk about prime influences compared to so-called secondary ones. This is especially true if contextual influences such as those coming from social and cultural systems are cast as simply a background or setting, awaiting human interaction, and not formative agents in-and-of-themselves. DST thus shuns what is called an 'interactionist consensus' that fails to ade-

quately capture the multitude of causal factors and the importance of actual changes occurring in the outside world that may not involve any direct interaction on the part of the organism (Oyama *et al.* 2001: 2).

DST radically challenges a privileging of genes by stressing instead multiple evolutionary influences in the development of individuals in their lifespan (in which they dynamically interact with society and culture) and over the long course of human evolution (Oyama 1985). DST also acknowledges human creativity to modify inherited and ever evolving ecological niches (which are not passive but actors themselves). This modification can then result in altered or even new selection pressures. So, once again, the experiences one accumulates throughout life by living and acting within complex sociocultural niches can have very real effects on both evolutionary processes and the individual (Baltes *et al*. 2006; Dunbar *et al*. 2009: 27–28; Oyama 1985, 2000; Tomasello 2009).

Classical Darwinian understandings of evolution narrow on natural selection and argue that competition for resources spurs adaptations and, in turn, reproductive success and survival. Nevertheless, the lively role afforded to society and culture by NCT, dual inheritance theory, relaxed selection, epigenetics, and DST also underscore the role of both cooperation and group living in human ontogeny and phylogeny. Of all the extrinsic contextual influences, even if we are to avoid playing favorites, group living surely does seem paramount to human evolution, interacting with competition as 'two-sides of the same coin' (Greene 2013: 24). Cooperation, in fact, has driven evolution as much as competition in that cooperation is usually preferred when the individual and collective goals are, at minimum, partially aligned. This means that cooperation is fickle and contingent. It is in constant danger of possible erosion, so cooperation must be attended to, maintained, and bolstered, especially through such group bonding practices as historical remembrances and representations about the collective, not to mention additional machinery such as laws, rules, police, school instruction, religion, ideology, and others to oversee cooperation (Greene 2013: 20–27; Tomasello 2009).

Some key terms when talking about cooperation include *kin altruism*, *kin selection*, *reciprocal altruism*, and *group selection* (*e.g*., Greene 2013: 28–65; Sterelny 2012: 10–16; Tomasello 2009: 3–47). Kin altruism increases individual fitness by contributing to group cohesion. Kin selection refers to altruism between relatives, when the product of altruism to recipients and the degree of relatedness is greater than donor cost. Reciprocal altruism explains how altruism between

non-related individuals evolved – namely, 'tit for tat,' that individuals take turns exchanging benefits over time understanding or hoping that reciprocity takes place.

Group selection is controversial. It broadens kin selection to members identifying as belonging to a group. This view has been attacked, particularly by those who privilege genes, but scholars (*e.g.*, Greene 2013: 28–65; Mesoudi 2011; Wilson and Sober 1998) have shown how group selection works well when discussing cultural practice. Natural selection can still apply, however, even if exaggerated, because individuals access and interact with culture by living in groups. Altruism and larger cohesive acts are therefore useable tactics for individuals to enhance fitness via strengthening the group in which they live. Sociocultural pressures can thus very much play a role in the evolution of behavioral traits.

Humans actually have a propensity for altruism and for extending trust and cooperation as long as the receivers of such are perceived kin – called *in-group* members. Culture, which can work to favor altruism by affecting ecological niches, can hence aid success and survival (Dunbar *et al*. 2009: 148). Selective forces, which include sociocultural contexts, can thus lead to greater or lesser degrees of cooperation, trust, and altruism. Michael Tomasello, in fact, sees cooperation as behind '"all of humans" most impressive cognitive achievements – from complex technologies to linguistic and mathematical symbols to intricate social institutions – [and] are the products not of individuals acting alone, but of individuals interacting' (2009: xv–xvi).

Within groups, however, individuals can directly cooperate or compete with each other. Individuals from a group generally join to either cooperate or compete with other groups. Certain altruistic traits consequentially emerge in individuals to increase *group fitness*, even if such traits can reduce individual fitness (Greene 2013: 23). Human traits and behaviors evolve at the group level, however, largely because they still bring fitness advantages to individuals comprising the group. This is intense in humans precisely because we are so social. Individuals that got along better with peers have tended to leave more descendants and, in the evolutionary sense, succeed. This process helps provide for identity formation and a sense of community as well, which in turn works to increase the individual desire to cooperate and help those seen as belonging to the group (*in-group effect*). Groupthink in contrast can endow group members with a dislike for members not seen as belonging – 'others' or *out-group members/effect*.

That humans evolved in sociocultural niches and, for the most part, have lived in permanent groups selected/influenced the development of a kind of brain that is adept at tracking, responding to, and/or transforming sociocultural cues, structures, and information. As Richard Menary states, 'Human cultures are comprised of a complex assortment of artefacts, practices, skills, representational systems, pedagogical systems, social relationships, social roles, institutions, legal systems, narratives, history, artworks, music and so on' (2014: 289–90). The focus here is on the human capabilities for learning that resulted from and further contributed to the evolution of human cognition, the development and transmission of human culture, and, generally, human evolutionary history. A broad overview of the general role of learning in evolutionary terms underscores its value to understanding cultural inheritance and transmission, as well as to again highlight the influence of culture on evolution.

Learning and its role in human evolution has bequeathed humans with an array of variability and *plasticity* (developmentally, behaviorally, and cognitively). 'This plasticity,' argues Menary, 'is driven by learning in a highly structured socio-cultural niche' (2014: 287). Learning has resulted from and further contributed to both human culture broadly and human evolution generally; from the physical to the cognitive and behavioral. Humans, for instance, can develop varied skills that allow them to cope with a wide array of environments. Even where skills are broadly of the same type, such as hunting, they can vary to cope with the differences in local environments. Think of the differences in environments between Aboriginal hunters in the Pilbara desert, hunter-gatherers in the Central American rainforests, and Inuit seal hunters (Menary 2014: 290; Sterelny 2003: 167). Our ability to cope with such wildly differing environments is both a testament to our plasticity and a way of recognizing the value of such for human survival.

Our environments therefore help explain how humans evolved, precisely because we have inherited richly structured cognitive and cultural environments (Menary 2014; Sterelny 2003; 2012). Sociocultural phenomena literally helped shape brain architecture and functioning. Learning, experience, and behavior, for example, can adjust boundaries between swatches of cortex devoted to different body parts, talents, and even physical senses (Pinker 2002: 45; Lende and Downey 2012). Individual minds (and bodies) are therefore shaped, thanks to plasticity, by the cultures in which they develop, including cultural practices, learning, and personal experience using and extending these capacities (*i.e.*, *cultural intelligence*). 'Brains can be grown

into different configurations, not because we are, at birth, fundamentally and irreducibly different, but because we become 'en-brained' as a result of our distinctive combination of genes, epigenetic influences, environmental factors, experiences, learning, and even understandings of ourselves' (Lende and Downey 2012: 32).

Culture thus becomes literally embodied and can change us in the process. The brain is thus more than a medium for culture's spread but also responds and/or adapts to sociocultural, material, and cognitive ecologies. Recent studies (Craig 2009; Kaliman *et al*. 2014), in fact, have pointed to evidence of specific molecular changes in the body following meditation and, in a different study (Berns *et al*. 2013), reading novels seemed to affect long-term changes in bilateral somatosensory cortex. If our plasticity and variability are products of evolution, and they are, this is because of both varied environments and because of cooperation within complex group settings (*i.e*., *social intelligence*). We possess the ability to make predictions and calculate the benefits and costs of such cooperation. Maintaining cohesion at the group level – full of members skilled at reading each other, weighing decisions, and even acting selfishly – requires a lot of work as a result. Kin and group altruism play vital roles here, as humans have made decisions about whom to trust and cooperate with most, relative to those whom they know most intimately and/or are encouraged to feel intimate with via narrative stories or other devices of social solidarity, such as memory works or religion. The evolution of the capacity to learn and be social undeniably proved crucial for the success of becoming and being human (Lende and Downey 2012).

Learning – affecting changes in the very structures and functions of the brain – has serious implications for a biocultural framework of memory. Because humans can learn socially and can read society and engage and even alter culture, cultural transmission plays a vital role in human evolutionary and cognitive history (Hermann *et al*. 2007; Menary 2014). Social intelligence theories indeed maintain that human intelligence is an adapted response to the complexity of the social environment and privileges a feedback loop between human society and cognitive capacity that drives the elaboration of each. Theories such as niche construction and developmental systems extend this further to include our social world as well as the cultural, technological, and physical environments. Humans are not just social, but rather hyper-social, cultural, and embedded in environments. We originally evolved complex social-cognitive skills good for competing and cooperating, but we carried on (*i.e*., *cognitive scaffolding*) to evolve skills

that enable us to fashion and refashion, assemble and reassemble, read, interpret, and affect distinct environments, as well as distinct cultural groups with their own unique artifacts, symbolic representations, beliefs, social practices and hierarchies, institutions, and memory works (Menary 2015).

III. A BIOCULTURAL FRAMEWORK OF MEMORY

A biocultural framework of memory is one that seeks to make connections between these complex evolutionary theories and cultural memory. The framework summons evolutionary reasons to illuminate the manifestation of historical remembrances and representations of the past – as memory works – across diverse societies. I contend that it can further help us understand something new – or at least approach it differently – about why and how the past functions in human societies.

Theorizing about memory and evolution begins with looking at the construction of – and interaction with – memory works as evolved human traits. This depends on seeing narrative broadly and historical narrative and memory works specifically as acts of reconstruction that convey more than surface meanings, but also deeper connotations. Adopting the view that narrative is a widespread human behavior, memory works are thus part and parcel of dynamic aesthetic, sociocultural, and ecological niches. Along with biology, memory works are both a product of evolution and something that can influence evolution in various degrees and at various levels (from the cognitive to the epigenetic, environmental, and cultural), generating a dynamic cross-level biocultural feedback loop whereby sociocultural phenomena exert reciprocal influences on biological phenomena (*e.g.*, cognitive capacity and mechanisms). Noteworthy here is the view in DST of the importance of changes occurring in the outside world that may not involve any direct interaction on the part of the organism. As we are a species that evolved hyper-socially to live in group contexts, broader changes in the historical, cultural, and institutional settings that structure our lives (including memory works) can have a vital influence regardless of how active we are in the construction of them. They represent a menu of opportunities and limitations.

Memory works, as part of a menu of opportunities and limitations, are still informational resources and modes of transmission from which we can interact, teach, and learn, acting as forms of influence, inheritance, or selection that factor into development and our evolution. This expands beyond a Darwinian conception of inheritance, especially vertical transmission that narrows on genetic information

transferred from parents to children. It extends notions of horizontal transmission (between peer members) and oblique transmission (between unrelated members) to allow for cultural evolution and nongenetic forms of inheritance and transmission on the one hand, and underscores the more expansive influence and role of sociocultural learning on the other.

Here one can apply Donald's theory of exograms. Recall that exograms are external sources and storages of information and representation. Relating memory works to exograms casts them as sociocultural traits/influences that are surely a part of our dynamic aesthetic, sociocultural, and ecological niches that function concurrently and coconstructively with biological forms of transmission and inheritance. This not only suggests the involvement of memory works in the reconfiguration and evolution of the human brain, cognition, and behavior (which are highly malleable and plastic), but also influencing the development of individuals as they strategically navigate sociocultural contexts in their daily lives. This potentially includes epigenetic influence as well whereby memory works can factor into epigenetic change throughout development, possibly influencing the regulation of gene expression and can (arguably) be transferred to offspring for many generations.

Also further consider memory works are especially powerful and influential when they collectively constitute and sustain dominant, as well as collected, memory, often controlled by hegemonic regimes of truth. Their power to influence grows. Dominant memory indeed consists of conceptions of the past that acquire dominance in public representations via memory works. Those memory works then become the main archival resource when seeking to construct historical representations. Because of this offloading and reliance on previous memory works, it becomes much more difficult to remember or represent the past outside dominant memory.

Memory works can also function to aid the fitness of individuals living within groups by fostering not only individual historical consciousness and sense of self, but also group significance given their strong every day, practical, and economical use-value in contemplating scenarios, events, and phenomena without necessarily having to experience such (though such engagement would constitute a type of experience). Perhaps even more meaningful is when historical representations are both popular and affective. Here engagement with memory works takes on an experiential component (*c.p.*, Crane 1997), an ‘affective turn’ (Agnew 2007), whereby historical thinking is an

activity that can powerfully force emphatic reflection and potentially affect historical consciousness precisely because individuals 'desire to touch and be touched by history' (Landsberg 2015: 9). When presented in emotionally rhapsodic ways, memory works can affectively engage individuals, which potentially opens them even further to the influence of memory works and their messages. This seems more powerful still when individuals are cast as *bricoleurs* in search of a useable past, one they often find in such affective memory works as those dealing with family, locale, and important sociocultural organizations such as the church.

Memory works have strong use-values for realizing attempts at expanding the definition of (in)groups precisely because of their ability to evoke and/or affect empathy, identity, and solidarity. There is no guarantee empathy will lead to a sense of solidarity or prosocial behavior with others, however, or factor into the construction of identity. Empathy here refers to our general capacity to resonate with others' emotional and intellectual states irrespective of their valence – positive or negative. 'An empathic response,' write psychologists Tania Singer and Olga Klimecki, 'can result in two kinds of reactions: empathic distress, which is also referred to as personal distress; and compassion, which is also referred to as empathic concern or sympathy' (2014: R875). Affective engagement with memory works can consequently also work to compel, defame, or delegitimate others as much as to legitimate and celebrate, harming or undermining in-group efforts at building cooperation and cohesion broadly by weakening broadly defined imagined communities.

Memory works and empathy are so vital to the construction of dominant/collected memory and imagined community. Recall that 'one of the important functions' of memory is that it has 'a remarkable capacity to create a sense of unity or "oneness" among people who would not otherwise see a meaningful sense of kinship' (Lambert *et al*. 2009: 194–95). Memory works function to bind group members together by instilling in them a sense of common mission, destiny, and empathic concern and sympathy. Recall that the goal is to create a shared likeness among differing, complicated, selfish individuals so that the group in which they live is further united and stable; to foster a sense of social solidarity, cooperation, and consent that, in turn, enables more well-bonded in-groups to outlast and outperform poorly-bonded outgroups – to increase in-group members' fitness odds both individually and communally (*c.p*., Dunbar *et al*. 2009: 174). In addition to many memory scholars, bioethicist Peter Singer also sees pat-

riotic narratives (*e.g*., national memory) as keen cultural traits and or/narratives helping a group bond (Singer 2011: 42). In reviewing group selection, fitness, and altruism, Singer argues that humans have evolved a propensity for altruism and for extending trust and cooperation as long as the receivers of such are, in actuality, perceived as kin. Memory works can thus function to 'expand our circle' (Singer 2011) of kin and kith and bring more people into the in-group (a vision of what Singer calls *A Darwinian Left* [2000]).

If further relating to the theory of relaxed selection, memory works can indeed become keen mechanisms to achieve group cohesion and fitness. The relaxation of selection not only opens the door to further considering the role of sociocultural influences in evolution, it also, as Deacon argues, takes place within particular aesthetic, sociocultural, and ecological niches. What was once involved in sparking and maintaining a trait, in our case whatever was involved originally in achieving social solidarity, shifted/offloaded from an innate localized mechanism or function onto a more distributed array of mechanisms, such as memory works, which function to foster group cohesion, definition, and sense of belonging. This redistribution effect allows for potentially new synergistic interactions and combinations that can contribute to either the degeneracy or dedifferentiation/modifycation of the antecedent trait or traits. Cast in this light, memory works have evolved to play an enlarged, expansive role in maximizing fitness and bequeathing group members with survival advantages, not only in crafting historical understanding, a sense of self, and community, but also in cognitive development and evolution.

The potential offloading of group cohesion and solidarity onto such cultural elements as memory works further highlights the potential power – and both problem and promise – of hegemonic regimes of truth, especially when memory works are so easily manipulated and influenced by regimes who, for whatever reason, might have differing agendas and goals (*e.g*., money, hegemony, or both) besides fostering solidarity or even healthy, happy individuals – and despite whether (in a Marxist-like critique) they confuse their self-interest with the best interest of others in classically liberal terms. Understanding memory works as connected to systems of power and hegemony not only links them to Foucault's conception of regimes of truth (who work to establish what truth is and to disseminate it), but it also connects them to literature more specifically about cognition and psychology, what Anastasio *et al*. have called a 'social hippocampus,' which includes 'opinion leaders in journalism, academics, politics, *etc*.'

(Anastasio *et al*. 2012: 106), and that can drive the formation/maintenance of collective intentionality – 'the power of minds to be jointly directed at objects, matters of fact, states of affairs, goals, or values' (Schweikard and Schmid 2013). This auspicates the power of hegemonic regimes to fashion affective stories and memory works that can simultaneously function to advantage some and disadvantage others, to potentially define a society's winners and losers. This can take the form of either animating or demeaning one group's memory works generally, or even altering the broader aesthetic, sociocultural, and ecological landscapes in which dynamic (and diverse) groups (re)construct their memory works, thus making their memory works more or less likely to be accepted or rejected by dominant groups (*e.g*., legitimizing a Whig history of white men in America, while delegitimizing the African American and LGBTQ communities and their concerns, their histories, and so limiting their menus of opportunity).

The potential power of hegemonic regimes of truth may also affect individuals who, as *bricoleurs* again, are busily constructing not only a sense of group belonging, but a historical understanding of the past as well. Said differently, hegemonic regimes of truth can influence personal conceptions, understandings, and knowledge of the past, individual meaning making and the formation/alteration of a sense of self, including a potential and willful subjection to, and/or appropriation of, hegemonic truth. Such regimes can also influence epigenetic and cognitive factors, even irrespective of the level of personal self-engagement and human agency (as in DST). Once again, the structuring of aesthetic, sociocultural, and ecological niches represents a menu of opportunities and limitations from which individual actors can choose. While not completely excluding immense human creativity to reassemble menu items in new, exciting ways, the power of regimes over individuals remains.

SUMMARY

The attempt to build a biocultural framework of memory borrows ideas from both evolutionary and memory studies. I argue that there are deep evolutionary reasons for the manifestation and use of the past across societies and through time. I have pointed out some potential implications of such a framework, from sociocultural effects to dynamics involving community formation, hegemonic power, and personal meaning making and influence (ranging from narrative identity to epigenetic and cognitive ramifications). As such, I assert that a biocultural framework of memory potentially enriches our understand-

ing of how, why, and in what ways individuals engage, appropriate, make sense, reassemble, and utilize memory.

A biocultural framework of memory rooted in evolution is only a start however. Next needs to come the development of a matured research methodology and research agenda, which is what I am working on currently. For example, because of the frequent citation of family history as a primary concern/attraction for individuals, a discourse analysis that links such to evolutionary theories of adaptive significance and species-typical behavior could tease at a possible research methodology for a biocultural framework of memory, similar to Literary Darwinism.[11] Also looking at fields such as neuroanthropology and cultural neuroscience signals the development of a possible research agenda. For example, neuroanthropology seeks to interrogate the experiential and neurobiological aspects of cultural activity, resting on the importance of neuroscience for illuminating that relationship and getting at what happens inside the person (Dominquez Duque *et al*. 2010; Lende and Downey 2012). Memory scholars can in this way work with neuroscientists and others to more intensely analyze the effect of memory works on brain architecture and function. Whatever the case, a biocultural framework of memory portends possible new and exciting ways to approach the study of memory.

NOTES

[1] Claude Lévi-Strauss's conceives of a *bricoleur* as one who creates and improvises (even alters, distorts, adds, deletes, reorders, and transforms) by appropriating existing materials and resources that are readily available and known (1966: 16–33).

[2] Pinker's view of human nature reflects well others in evolutionary psychology whereby it is said to be our collection of universally shared adaptations (see Downes and Machery 2013 for more discussion of this and other contrasting accounts of human nature). Most dictionary definitions of human nature, however, narrow on 'fundamental' human 'traits,' 'dispositions,' 'behaviors,' and 'qualities' shared across cultures (*e.g*., Merriam Webster Online, http://www.merriam-webster.com/dictionary/human%20nature; Online Encyclopedia Britannica, https://www.britannica.com/topic/human-nature; and Cambridge Dictionary, http://dictionary.cambridge.org/dictionary/english/human-nature).

[3] Phenotype refers to any 'observable characteristic of an organism, including, for example, its morphology, behavior, and physiological or developmental processes' (Whitlock 2017: 40). With that said, according to Susan Oyama, 'An informal memory check suggests that once phenotype came to refer to the organism, it was restricted pretty much to the body (often just the appearance of the body).' It was not until 'recently,' she argues, that 'behavior has been included' (2000: 17).

[4] Cultural evolution is a 'process of change in the traits manifested within a population that is explained by various forms of social learning among species members' (Hannon and Lewins 2017: 795). For a good review of cultural evolution research, see Mesoudi *et al*. 2006. Key here is that 'theories of cultural evolution allow a significant amount of nongenetic, learning-based inheritance' (Hannon and Lewins 2017: 796).

[5] Accounts of cultural inheritance/transmission typically refer to the transfer of nongenetic information from individual to individual through 'learning.' Said differently, cultural transmission is a system of sociocultural information transfer that affects an individual's phenotype via learning (Hannon and Lewins 2017: 799; Richerson and Boyd 2005).

[6] Dual Inheritance Theory is defined herein as a 'model of cultural evolution which views genes and cultural elements (*memes*) as separate forms of inheritance (Dunbar *et al*. 2009: 201; emphasis added). This also included my first encounter with the concept of Richard Dawkins's memes. Memes are often cast as like genes in the Mendelian sense because they are observable elements, such as rules of behavior, laws, and ideas, which are passed on, usually more or less intact, from a so-called cultural parent, say an actual parent, to a cultural offspring, say child. Memes differ from genes, however, in that the mode of transmission is typically (not always) from learning and not biological reproduction. Here memes are more like viruses and infections because transmission can involve nonrelated individuals and can reproduce much more quickly (see Dawkins 1976). While I do not make use of Dawkins's meme theory herein, note that other scholars have taken exception with it by pointing out that cultural traditions, structures, representations, *etc*. are not so much replicated as a gene analogy would hold, but transferred and transformed, even if only slightly (Sperber 2001: 100–18, 2001: 163–73). This represents perhaps the greatest weakness to meme theory in that it can discount a lot of dynamic creativity that is possible at any moment of cultural transmission. The creativity of the cultural offspring can alter (or not) the meme, and in lesser or greater degrees.

[7] This view is often referred to as the 'adapted mind,' though protagonists often confront accusations of determinism, particularly as they claim that humans have behavioral predispositions. Yet, predisposition, they argue, does not mean predestination. A predisposition to act in some particular way, especially under certain circumstances or environments, does not necessitate particular behaviors. We are not 'hardwired' (a common pejorative within the humanities when discussing science), but we do possess similar 'hardware' fashioned by evolution (*c.p*., Dunbar *et al*. 2009: 7, 60; Pinker 2002: 122–23). Ultimately, an evolutionary perspective, even of the adapted – and adapting – mind (the gift of our phylogeny), reminds us that human character is not fixed. Rather, evolution bequeathed humans with plastic and malleable brains (see Marcus 2004, 2008), which all but guarantees extremes in individual and cultural variation, particularly within widely different contexts and environments. Too, this includes continued adaptability/evolvobility in real time and accounts for the ever-present and potential influence of society and culture in a dynamic multidirectional and multidimensional interaction between individuals, society, and culture – what psychologist Paul Baltes and others call *cross-level biocultural co-constructivism* (*i.e*., sociocultural contexts exert reciprocal influences

on neurobiological mechanisms throughout a person's lifespan) (Baltes *et al*. 2006). That last means, first, that humans evolved not only to create and influence culture, but also to be impacted and influenced by culture, broadly marking culture – whether originally or not – as a fundamental force and source of information in human (cognitive) evolution and development. Second, it means humans continue to interact with culture in real time, shaping – and shaped by – culture, whether explicitly or implicitly, thus creating a cumulative effect over evolutionary and historical time (*i.e*., *ratchet effect*) (Tomasello 2009; Sterelny 2012).

[8] Others have framed the evolution of human cognition differently from Donald (*e.g*., Tomasello 1999; Marcus 2004). Debates rage over the existence or importance of innate structures (*e.g*., Pinker [2002] and the modularity of mind), the role and importance of cognitive development and reassembly over an individual's lifespan (Oyama *et al*. 2001), the social dimension of cognition (Vygotsky 1978), or the human mind as nothing more than a haphazard construction – a 'kluge' (Marcus 2008).

[9] For example, according to Lahti *et al*., 'eyesight is said to be under relaxed selection in lightless caves; a habitat free of herbivores or predators relaxes selection on previously evolved defenses against them; and the disappearance of toxins or pathogens results in relaxed selection for resistance' (2009: 1).

[10] Take as another example the development of antibiotics, which relaxed selection for the development of innate resistance and shifted/offloaded it back onto antibiotics and their continued development (Lahti *et al*. 2009: 4).

[11] Literary Darwinists seek to deconstruct texts with the aim of identifying and elaborating on species-typical motives. They want to correlate narrative themes with species-typical characteristics, coupled with societal and cultural contexts, performances, practice, *etc*. For example, Brian Boyd uses kin selection to analyze conflict in Shakespeare's *Titus Andronicus* and Carroll uses psychology of evolved sex differences to analyze Oscar Wilde's *The Picture of Dorian Gray*. The list is vast, but Carroll provides a great overview in *Oxford Handbook of Evolutionary Psychology* (Dunbar and Barrett 2007: 637–48).

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