



# ORAL TRADITION

## Festschrift for John Miles Foley

**This article belongs to a special issue of *Oral Tradition* published in honor of John Miles Foley's 65<sup>th</sup> birthday and 2011 retirement. The surprise Festschrift, guest-edited by Lori and Scott Garner entirely without his knowledge, celebrates John's tremendous impact on studies in oral tradition through a series of essays contributed by his students from the University of Missouri-Columbia (1979-present) and from NEH Summer Seminars that he has directed (1987-1996).**

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## Variation within Limits: An Evolutionary Approach to the Structure and Dynamics of the Multiform

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One<sup>1</sup> of Albert Lord's more surprising discoveries about living oral traditions was that no two oral performances of the South Slavic epic that he collected were precisely the same (1953).<sup>2</sup> Scholars before Milman Parry and Lord seem to have assumed that any long performance must have been of a text that had been memorized *verbatim*. It took the Theory of Oral Composition as originally developed by Parry and Lord and elaborated and refined in the decades since<sup>3</sup> to explain why in many traditions no two performances are the same at the level of the word and sentence even though the audiences and the performers state that the "same" story is being performed (cf. Foley 2002:12-20). Recent work has shown how the influence of the "performance arena" and the differing skill sets and tendencies of individual singers contribute to the significant variation in the exact words used in any given performance of a specific song (Foley 1995:8-11). But although individual performances vary, they do not vary infinitely, for if they did, there would be no tradition. Oral Theory has used the term "multiform" to describe verbal or textual entities that display this "variation within limits" (Foley 1991:6-8, 1998:149).

Although use of "multiform" both as adjective and noun is widespread in scholarship, it remains difficult to find an agreed-upon definition. Lauri Honko's description of multiforms as "repeatable and artistic expressions of variable length which are constitutive for narration and function as generic markers" (Honko 1998:100-05; cf. Foley 1995:102) is probably as close to a consensus as one can find, but the problem that Lord noted in *The Singer of Tales* remains:

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<sup>2</sup> Lord provided extensive documentation on living traditions for phenomena that had been previously noted—at least in passing—as early as 1885 by Vasilii V. Radlov (xvii) who pointed out that the *Bildtheile* ("idea-parts") from which traditional poets assembled poems were "plastic, multiform entities" (the description is Foley's [1988:15-17]). Matija Murko also noted the variability in traditional performances (1929:22). For an overview of this critical history, see Foley 1988:15-17.

<sup>3</sup> See Foley 1988.

“unlike the oral poet, we are not accustomed to thinking in terms of fluidity. We find it difficult to grasp anything that is multiform. It seems to us necessary to construct an ideal text or seek an original, and we remain dissatisfied with an ever-changing phenomenon” (1960:100). Despite the efforts of many scholars to explain the phenomenon of multiformity (perhaps epitomized by Foley’s *How to Read an Oral Poem* [2002]), it remains difficult to think and talk about the multiform without collapsing it to a single, textual entity.<sup>4</sup> Scholars do not even agree completely on the *size* of multiforms: Parry and Lord’s original approach limited varying formulas to circumstances with identical metrical conditions (although Lord also discussed “themes” that were groupings of ideas [1960:68]), but more recent work has identified much larger multiforms that extend well beyond sentence length (Honko 1998:102-14), and the scholarship seems to be moving in the direction of identifying as multiforms even complete songs (Foley 1998).<sup>5</sup> The work of Gregory Nagy in developing an “evolutionary” model has been influential in this area, in particular his view that the multiform should be understood in relative rather than absolute terms, so that any particular composition could be more or less multiform “along a graded continuum” (Nagy 1996, 2001:109-10). That multiforms vary at different levels from the micro to the macro is borne out by studies such as Honko’s of Siri epic or Foley’s work with the variants collected by Parry and Lord (Foley 1998). Nevertheless, significant disagreements among researchers remain, both in theoretical terms and, more specifically, about the relative multiformity—and attendant orality—of particular works (for example, the Homeric *Iliad* versus the *Cypria* [Finkelberg 2000; Nagy 2001]).

This state of difficulty is not confined to purely oral, or even primarily oral, traditions, either. In medieval studies Paul Zumthor’s discussion of *mouvance*—most succinctly expressed by Bernard Cerquiglini’s assertion that (1989:111) “l’écriture médiévale ne produit pas de variantes, elle est variance” (“medieval writing does not produce variants, it is variance”)—brought about significant changes in both theoretical approaches and editorial practices (Zumthor 1972, 1987).<sup>6</sup> Although Cerquiglini’s position is seen as extreme in contemporary medieval studies, the variable nature of texts—even when they are not considered to be particularly close to an oral tradition—has become more central to scholarship. Katherine O’Brien O’Keeffe has demonstrated that in the Old English tradition “an oral poem did not automatically become a fixed text upon writing” (O’Brien O’Keeffe 1990:46), and more recently Gísli Sigursson’s work on Old Icelandic sagas has shown that even long prose texts are surprisingly multiform (Sigursson 2004 and 2012). Analysis of multiformity is therefore not restricted to the discipline of oral tradition studies but is instead a general literary problem (although the variable nature of texts is often masked by editorial practices).

But despite developments both applied and theoretical, the challenge that Lord identified in 1960 remains: our minds find it difficult to grasp multiformity, and this cognitive weakness hampers our efforts to analyze this extremely important aspect of traditions. Fortunately, other

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<sup>4</sup> Such difficulty remains even if this epistemic shift is performed unconsciously (Ramey 2011:1-5).

<sup>5</sup> For the conversion of multiforms into single-text entities, see Foley 2004.

<sup>6</sup> For useful discussion of these issues, see Millett 2008; for a concise introduction to the problems of variation, *mouvance*, and the current turn towards material philology, see Drout and Kleinman 2010.

disciplines have grappled with similar conceptual difficulties. Evolutionary biology, in particular, has been struggling with problems of multiformity since the “heroic age” of natural history collection in the nineteenth century, when it became apparent to scientists that the morphologies of individual animals within a species could vary substantially.<sup>7</sup> For centuries biologists had spoken of individual animals as imperfect representations of the ideal morphology of a given species, but this typological approach to variation became unsatisfactory as the Darwinian revolution unfolded and it became increasingly clear that there was no way that an idealized species type could exert any influence on individual animals. In response, biologists developed the “biological species concept,” the idea that the ability to interbreed is the only non-subjective test of whether or not two variant forms belong to the same species. From the biological species concept arose what Ernst Mayr dubbed “population thinking” (Mayr 1959; O’Hara 1997), an understanding of species not as natural types but as a varying population of interbreeding individuals. This population thinking is analogous to the frame of mind that scholars in oral traditional studies try to adopt towards the problem of the multiform, which cannot be captured in a single text or performance, or even in the minds of full participants in a given tradition (Foley 1991:6-10).

The parallels between oral tradition studies and population thinking in biology are clear, but there are problems that prevent us from applying unmodified biological approaches to the problem of the multiform. Population thinking is difficult because the human mind easily thinks in terms of forms and types and is less able to visualize a statistical range of morphological differences. More importantly, the dynamics of cultural evolution are not fully captured by a purely biological approach: because our minds construct cognitive prototypes—epitomes of particular mental categories—from features detected by our perceptual systems, the multiform that scholars discuss is an abstraction based on the characteristics of a population of individual cultural entities held in different individual minds. When we think about “the multiform” we are (sometimes despite ourselves) constructing a prototype from those instantiations of the tradition that we have encountered. This process is not limited to scholars studying oral traditions; it affects participants in traditions as well.

In what follows I will argue that the existence of cognitive prototypes and the dynamics of human communication generate selection pressure that limits the variation of individual entities within a cognitive category. The population that makes up the multiform evolves towards prototypes, and this evolution supports morphological stability. The structure of multiforms can be described in terms of a *morpho-semantic* hierarchy in which formal features can, through the process of *traditional referentiality*, become associated with each other across levels of the hierarchy. This phenomenon, *feature interlink*, tends over time to bind cultural entities into stable configurations. We can conceptualize the variability space for any such cultural entity as an *adaptive landscape*, but we add to this visualization (invented for biology) the non-biological variation of the cognitive prototype exerting selection pressure on entities to evolve towards a prototypical form. The variation-within-limits of the multiform is then the expected result of the

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<sup>7</sup> For the types and distribution of variation that can be found within species, see Gould 1985. For the biological species concept, see Mayr 1942.

structure and dynamics of a cultural entity shaped by both the human mind and universal processes of replication and selection.

It is not the goal of this essay to obviate current theorizing about the multiform or provide evidence for one side or the other in disputes about the relative multiformity of different traditions. Rather, the conceptual framework proposed here is intended to enable the integration of various analyses by scholars working in multiple traditions and using a variety of approaches. Oral tradition studies were born when Parry and Lord combined philological analysis with sociological fieldwork and created a whole greater than the sum of its parts. Thanks to decades of good stewardship, the field has continued to bring together divergent perspectives, producing knowledge that could never have been discovered within the bounds of any single discipline. A convergence between evolutionary biology, cognitive psychology, and oral traditional studies is another step in this continuing development.

### **The Adaptive Landscape**

Imagine a rugged landscape characterized by valleys and peaks, foothills and plateaus. The horizontal area of the landscape represents *morphospace*, all the possible forms of the particular organisms or entities we are examining. The height at any given point represents “fitness,” the degree to which the particular characteristics of the entity enable it to survive and reproduce. In biology that concept of fitness is tied to the physical competition for resources that always become scarce as population expands to the carrying capacity of the particular environment. Fitness in cultural evolution is only slightly different, but the limiting factors are not those of the physical environment but instead ones primarily associated with finite human attention and memory. Some cultural entities have forms that make them more likely to be noticed, remembered, and re-transmitted than others. We describe these reproducing morphologies as having greater fitness than those forms that are not reproduced. Therefore, by simple inspection of the landscape, we can judge the fitness of a given form: the higher up a mountain, the more fit to its local environment a form is; the lower down in a valley, the less fit. This *adaptive landscape* (or *fitness landscape*) was devised by the biologist Sewall Wright in 1932.<sup>8</sup> Long used for thought experiments in evolutionary biology, the adaptive landscape can be a precise mathematical tool,<sup>9</sup> but it is also a powerful metaphor that represents complex interrelations between comparative morphology and fitness in ways our minds find intuitively simple: relationships of topography.

To better understand the adaptive landscape, it is helpful to begin with a simplified model, see how it works, and then expand the model to account for more complex phenomena.<sup>10</sup> To this end we will construct a representation of variant fitness in the Anglo-Saxon poem

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<sup>8</sup> For further discussion, see Arnold et al. 2001:9-32, and for critique, see Coyne et al. 1997. The discussion that follows has been guided in particular by Gavrilets 2004.

<sup>9</sup> See Gavrilets 2004:21-22 on the distinction between a mathematically rigorous landscape and the more metaphorical approach that I take here.

<sup>10</sup> I have made some modifications to the discussion of Gavrilets (2004) both in structure and terminology.

*Cædmon's Hymn*,<sup>11</sup> a short text from the eighth century that has long been at the heart of debates about the oral nature of Anglo-Saxon poetry.<sup>12</sup> According to the Venerable Bede, Cædmon was an illiterate cowherd who was given the miraculous gift of poetry. Previously unable to sing at all, after being visited by an angel in a dream, Cædmon became able to turn instruction in church doctrine or Christian history into Old English verse.<sup>13</sup> The story of Cædmon has been seen as a clear example of oral traditional poetry in Anglo-Saxon, and an analysis of the story and poem was the foundation of Francis Peabody Magoun's 1955 article, "Bede's Story of Cædmon: The Case History of an Anglo-Saxon Singer," the first essay to use oral tradition approaches for the study of Old English texts. Although the precise degree to which our current texts of the poem reflect an Anglo-Saxon oral tradition is disputed, for the purposes of this argument I will adopt the broadly accepted notion that the poem represents many of the features of oral tradition in Old English. At the very least it has a greater claim on oral origins than any other poem in Anglo-Saxon, and there is no evidence inconsistent with oral origins.<sup>14</sup>

The hymn is particularly valuable for developing a simplified adaptive landscape because we have many manuscript witnesses that include a number of variants. There are twenty-one medieval manuscripts that include *Cædmon's Hymn*. These have been collected and edited in the most recent edition by Daniel O'Donnell (2005). For reasons that will become clear, we will focus on line five, which appears in Elliott van Kirk Dobbie's standard edition as "he ærest scop eorðan bearnum" ("he first shaped, for the sons of earth . . .") (1942:106).<sup>15</sup> There are two variations in this line, one in the a- and one in the b-verse. In the a-verse the word *scop* appears in thirteen manuscripts, while the prefixed form *ge-scop* appears eight times in the corpus. (The *ge-* prefix in Anglo-Saxon can indicate a perfective sense of a verb.) Even more significant is the variation in the b-verse: eleven manuscripts have forms that mean "of earth" (the *eorðan* recension) while ten have "of old"<sup>16</sup> (the *ylða* recension). Other minor variations throughout the *Cædmon's Hymn* corpus (with one exception)<sup>17</sup> are orthographic or dialectal, and I interpret them

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<sup>11</sup> This section of the discussion is in part inspired by David C. Rubin's work (1995:240-41).

<sup>12</sup> The story of Cædmon and his miraculous gift of poetry is found in book IV, chapter 24 of the Venerable Bede's *Ecclesiastical History* (Colgrave and Mynors 1969).

<sup>13</sup> There is a massive literature on the story of Cædmon, its political, historical, and religious implications, and its likelihood of being true. For analysis and bibliography, see O'Donnell 2005:1-28, 187-90.

<sup>14</sup> O'Donnell (2005:187-90) very briefly dismisses the possible orality of the transmission of the poem, focusing on the "conservatism" of a particular line of presumed textual transmission. This critique makes the very common mistake of equating orality with extreme fluidity. For the oral origins see, *inter alia*, Magoun 1955 and O'Brien-O'Keefe 1990. (For a parallel in Classical Studies, see Nagy 2001:112-15 with discussion of the differences in variation between the *Iliad* and the *Cypria*.) A very short text such as *Cædmon's Hymn* can easily be memorized *verbatim*, thus limiting—but not entirely eliminating—variation.

<sup>15</sup> O'Donnell reconstructs the hypothetical ancestor of the line as "he aerist scop eorðu barnum" (2005:205).

<sup>16</sup> "Of old" is usually taken as a metaphor for "of men," that is, "conceived as the successive generations, or men of old" (Pope 2001:193).

<sup>17</sup> In MS Tr1 (using O'Donnell's sigla), *hu* appears instead of *he*.

not as representative of substantive variation in the poetic multiform but instead as generated in the copying process.<sup>18</sup>

We can represent the total variation of the line thus:

A: scop  
 a: gescop  
 B: eorðan  
 b: ylda

The four morphotypes of line five—AB, Ab, aB, and ab—are represented in the manuscript record in different numbers:

AB: 9 appearances / 43% (MSS Br, B1, Hr, C, CArms, Ld, T1, P1, To)  
 Ab: 4 appearances / 19% (MSS M, Di, P, PSanM)  
 aB: 2 appearances / 10% (MSS Ca, O)  
 ab: 6 appearances / 29% (MSS Tr1, Bd, H, Ln, Mg, W)<sup>19</sup>

For the purpose of this argument we will treat representation in the manuscript record as a proxy for the *fitness* of a particular morphotype and therefore calculate fitness of a given form as the fraction of the total population it represents. This argument does require two potentially problematic assumptions. First, we assume that morphological variation is visible to selection so that the particular form of a line affects its likelihood of being reproduced. Without very large data sets it is impossible to prove this point with statistical rigor, but the evaluation of singers and performances by participants in traditions (and later by scholars) demonstrates that different forms of songs are considered more or less aesthetically accomplished and thus more or less likely to be reproduced, either by being remembered and performed by other singers or by being incorporated into textual records (see Foley 2004:102-06). Evaluators must be basing their evaluation on detectable variations in performances, so it is not a great leap to suggest that even subtle differences in word choice affect a variant's inclusive fitness; the model system merely isolates a few particular variants. More problematic is the assumption that the distribution of variants in the surviving documentary record represents the distribution of those variants in the original complete archive. Preservation can be evidence, albeit probabilistic evidence, for the inclusive fitness of variants, but the Anglo-Saxon documentary record is seriously incomplete, and we cannot know if preservation of witnesses of *Cædmon's Hymn* was non-random. It is possible that there were many additional manuscript witnesses of the poem that have been lost,

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<sup>18</sup> The boundary between significant poetic variation and the influence of dialect and orthographic practice can be very difficult to draw, but the particular case of line five is less muddled than many related problems. The variation between *eo* and *o* in forms of *scop* is reasonably interpreted as orthographic, and the differences in spelling between Northumbrian and West Saxon recensions as dialectal. The *ge-* prefixed forms of the “shaped” verb are at least grammatically distinct and thus potentially significant stylistically. The difference between “of earth” and “of old” is substantive.

<sup>19</sup> Percentages are slightly rounded and therefore do not total 100%. Manuscripts in each category are identified by O'Donnell's sigla (2005:79).



and these might show completely different distributions of variants (although we have no direct evidence for this hypothesis). However, as long as we remain cautious about drawing any conclusions that rely too heavily on any specific numerical distribution, we can use manuscript preservation as a crude proxy for overall popularity. This proxy is not ideal, but we must make do with the information available to us, and in any event the point of the exercise is to develop a simplified model. A much more complex landscape could be generated by the variants of Siri epic recorded in Honko (1998), but using *Cædmon's Hymn* allows us to see more clearly the workings of the model before we elaborate it.

We can graphically illustrate the fitness of the population of variants by creating a three-dimensional representation in which the x-axis indicates the *scop* / *gescop*, the y-axis the *eorðan* / *ylda* variation, and the z-axis the fitness of each morphotype.

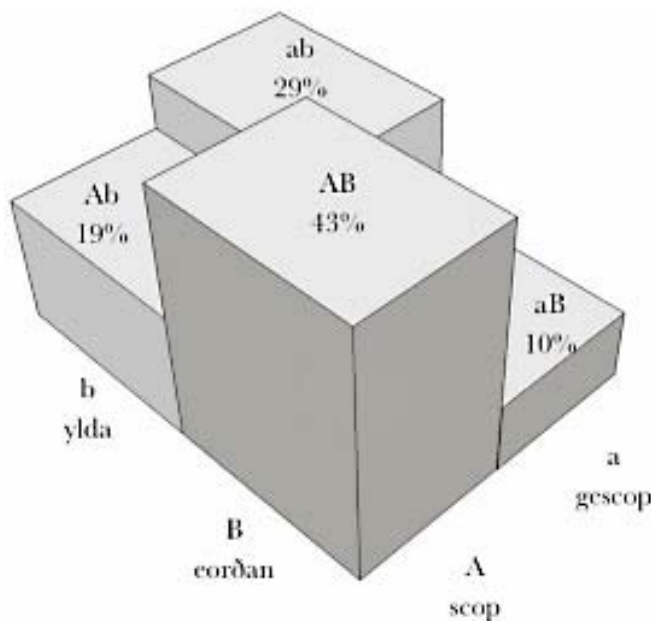


Figure 1. Representation of the relative fitness of morphotypes of *Cædmon's Hymn*, line 5.

We can also represent additional varying characters by continuing to add dimensions to the diagram (for example, adding a fourth dimension to represent the variation between *he* in 5a, which occurs in 20 manuscripts, and *hu*, which appears only in MS Tr1). But fitness landscapes in higher dimensions, while amenable to mathematical analysis, are not easily visualized, so we will work in the familiar three dimensions. This approach is justified not only because the purpose of the adaptive landscape is to help channel intuition, but because many minor characteristics may

Figure 1 illustrates the fitness of all the possible combinations of characteristics and is therefore a model of the *fitness space* of our model.<sup>20</sup> The three-dimensional landscape allows us to grasp intuitively which combinations of characters are more and less fit, and to what degrees they are similar to each other (based on proximity in the diagram). If there were further variations in the particular characters (that is, if there were a third, fourth, or fifth term that varied instead of all witnesses being either *eorðan* or *ylda*), we could add more blocks to the diagram, eventually creating a “skyscraper” landscape, as in Figure 2.

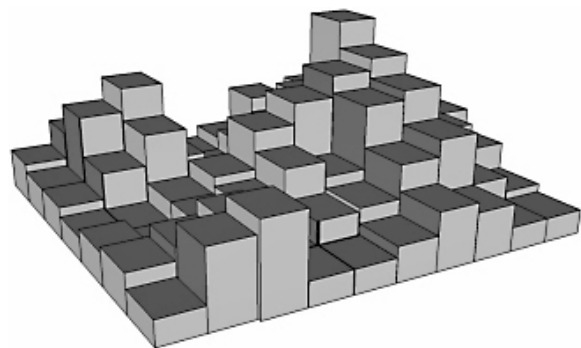


Figure 2. “Skyscraper” landscape represents fitness of multiple discrete morphotypes.

<sup>20</sup> This illustration is a variation of Gavrilets’s Figure 2.4 (2004), which in turn was inspired by Nei et al. 1983.

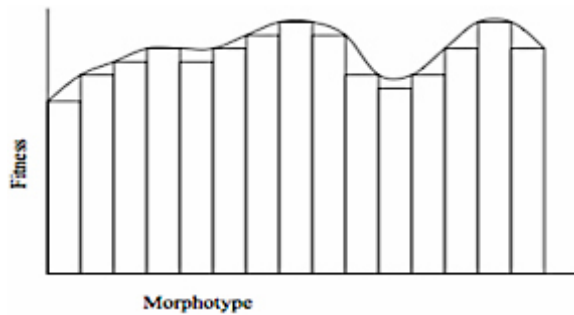


Figure 3. Many minor variations of morphotypes create a near-gradient.

the landscape will be depends upon the underlying dynamics of the system: some characteristics, such as sentence or scene length, can vary continuously; others are discrete. But even if all characters were discrete, there are so many features in even reasonably small multiforms—such as “Silken Cradle,” “Caring,” and “Name-giving” in Siri epic as sung by Gopala Naika (Honko 1998:106-10)—that at the level of compression required for us to see its contours in a single figure, the adaptive landscape will look like terrain (see Figure 4).

The adaptive landscape represents the full range of *possible* forms for the entity in question, but not all of these forms may actually exist in the world.<sup>21</sup> If we want to use the landscape to perform thought experiments on the evolution of cultural entities, we must populate it, either by scattering entities randomly (representing an initial diversity of forms) or by having them start out homogenous and therefore occupying only a small part of the landscape, as in Figure 4.

We simulate morphological evolution in the population by applying rules of change and inheritance to the entities in the adaptive landscape. For example, we might allow every entity to have offspring who are slightly different from their “parent” entities. We can then simulate competition by making the offspring with the highest fitness score reproduce in subsequent generations. We can also limit the total number of individuals, with those with the lower fitness values being eliminated in favor of those with higher fitness values. By running the simulations and examining the underlying mathematics, we can predict how varying entities will come to populate the fitness landscape over multiple generations. The most significant phenomenon we will observe is that lineages tend to “hill-climb” up the adaptive landscape to the peaks from the valleys through the replacement of less fit forms by one with greater fitness and thus greater height in the landscape (Sewall Wright 1932; Simpson 1953:154-59). Variation appears to be

be correlated, as variables are often dependent upon each other.

The “skyscraper” visualization represents only discrete changes, such as that between *eorðan* and *ylda*, so each particular morphotype is represented by a large block. But adaptive landscapes can also represent a much more finely grained morphospace simply by adding many small blocks to represent the range of minor variants such as we would find in a longer passage of text (see Figure 3). How continuous

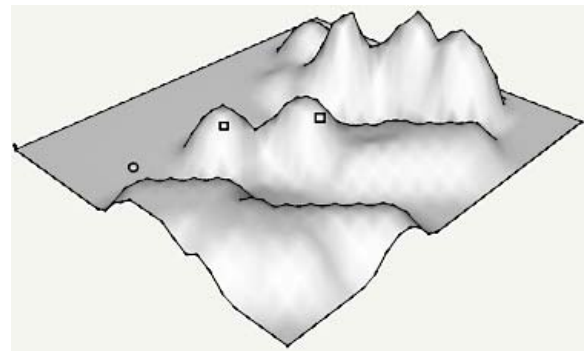


Figure 4. Adaptive landscape populated with entities.

<sup>21</sup> For discussion, see Raup and Michelson 1965:1294-95; Dawkins 1996:214-22; Tursch 1997. A recent discussion (Dorit 2011) tilts at the straw man of perfect adaptationism but is nevertheless useful.

channeled towards the local optimum in morphospace because of the “ratchet effect”: improvements in fitness are noticeable because those organisms occupy new locations in the adaptive landscape, but decreases in fitness are invisible because they either put an organism into a location that is already occupied (hence not visibly different) or a lower-level spot that leads to extinction. The entities themselves are not moving; they are simply reproducing and thus bequeathing both similarity and variability to their offspring, but the effect is to populate the higher areas of morphospace that represent greater fitness. The peaks in the landscape, then, are *attractors*, locations at which lineages will eventually arrive if they continue to evolve in the fitness landscape.

### The Morpho-Semantic Hierarchy

The variants we examined in line five of *Cædmon’s Hymn* are lexical (*eorðan/ylda*) and morphological (*gescop/scop*). These variants do not affect the alliteration or prosody of the line because the Old English poetic system allowed vocalic alliteration (so the *eo* diphthong alliterates with *y*) and *ge-* is unstressed and so in this metrical context optional. It is not difficult to imagine other variants, however, that would affect the alliteration and meter of the line. For example, if *eorðan* were to be replaced with *manna* (“of men”) or some other word with consonantal stress, the line would no longer alliterate. If *scop* were replaced with a multi-syllabic verb, the line might no longer scan properly. Similarly, there are an enormous number of words that simply could not fill the *eorðan/ylda* slot for reasons of grammar and sense: “God shaped earth for the yellow of fish” would not be likely to be reproduced by an Anglo-Saxon poet or a later scribe.<sup>22</sup> The limits to variation are not restricted to the grammatical and formal properties of the line but also include semantic features of words, phrases, sentences, and larger units of meaning. Furthermore, the semantic fitness of a particular unit is influenced not only by its denotative meaning, but also by its connotations. A particular combination of words could be grammatical, flawlessly alliterating, and productive of an aesthetically pleasing visual image but nevertheless have low inclusive fitness because it was politically or socially unacceptable to performer or audience.

We can arrange these fitness criteria along a *morpho-semantic hierarchy*, an arrangement of attributes from those utterly essential to the most nebulous: some parts of speech simply cannot substitute for others,<sup>23</sup> and variation in rhyme scheme and meter is significantly limited, but a replacement for “bearnum” in line five of *Cædmon’s Hymn* probably could be one of many agents, and the subtle degrees of orthodoxy in the poem’s oft-debated creation theology would probably not be a complete determinant of whether or not the poem is copied. Grammatical,

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<sup>22</sup> At least while the language of the exemplar was still understood by the scribe, which is the only time frame relevant for the purposes of this argument. Note, however, that when there is significant separation between the language of the scribe and the language of the exemplar, some scribes can preserve (or produce) nonsensical readings (for example, line 2921 of *Beowulf*, in which neither scribe seems to have recognized the name of the Merovingians [see Shippey 2005]).

<sup>23</sup> Note, though, how e. e. cummings generates aesthetic effects by violating these constraints in poems like “anyone lived in a pretty how town” (1957:351-52).

metrical, formal, and semantic qualities are higher up in the hierarchy than are the thematic and symbolic features of a work, and orthographic and dialectal variation is less constrained than changes in lexis or morphology. However, in differing cultural environments, different levels of the morpho-semantic hierarchy will contribute differentially to inclusive fitness.

### Feature Interlink

But even though the morpho-semantic hierarchy is present, it is not arranged like an onion in neatly separable layers. Rather, particular characteristics can be linked to each other across levels, so that change in one necessitates change in the other. The example given above of *manna* replacing *eorðan* or *ylða* shows that a change in meaning could be blocked by the criteria of alliteration if the variables are not independent. *Manna* may contribute more than *eorðan* to fitness in semantic terms, but the degradation in alliterative fitness may be so great that the resultant morphotype would occupy a significantly lower position in the adaptive landscape. The space between morphologies may therefore not be a smooth gradient in all directions, and when this is the case, the variation of a multiform is constrained in multiple dimensions.

The phenomenon of *traditional referentiality* further constrains variability. Traditional referentiality is the process by which a specific formula, type-scene, or other recognized pattern in a text calls up *pars pro toto*, that is, “a context enormously larger and more echoic than the text or the work itself” (Foley 1991:6-8), thus allowing “grey-eyed Athena” or “Hector of the glancing helm” to invoke not merely one attribute of a well-known character, but that character’s entire persona as developed throughout a tradition (Foley 1995:5). Traditional referentiality is generated by the combination of repetition with associative memory (Drout 2006). As a multiform is copied and re-copied, its various features become associated with each other. Thus a particular rhyme scheme and prosody (at a lower or middle level in the morpho-semantic hierarchy) can become linked through associative memory with a theme (at a higher level). For example, in South-Slavic oral tradition the decasyllabic line, the *deseterac*, is associated with the *genre* of epic; in the written tradition of English literature, the *form* of the sonnet is associated with the *theme* of romantic love. This *feature interlink* serves to bind together the multiform into less variable configurations than a non-interlinked multiform would be.<sup>24</sup> The more a particular multiform is repeated, the more the process of traditional referentiality binds together features, and traditional multiforms are, by definition, repeated (else they would not be traditional). The binding of features together in complexes makes some areas of morphospace inaccessible to a reasonably long multiform, not only because some particular feature combinations will not be possible, but because an interlinked multiform may not be able to traverse particular regions of morphospace leading to a higher summit. The more tightly bound a multiform is, the smaller the area of the adaptive landscape that will be occupied by its variants. When we combine this process with the hill-climbing behavior of entities in a competitive, evolutionary environment, we generate an adaptive landscape characterized by mountains surrounded by plains or valleys of non-adaptive morphotypes.

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<sup>24</sup> See Rubin 1995:90-121, 229-56.

### The Traps of Local Maxima

There is selection pressure on every lineage to evolve toward forms that are higher up the adaptive landscape, but because the landscape is not homogeneous, not every point leads to every other point by simple hill-climbing. In Figure 5 we see that an entity that starts at point x can evolve to point y, but point z is not reachable without a significant *decrease* in fitness that would enable the entity to move lower in the landscape (crossing the valley) before moving up the peak towards the higher summit z. This decrease in fitness is prevented by all the entities

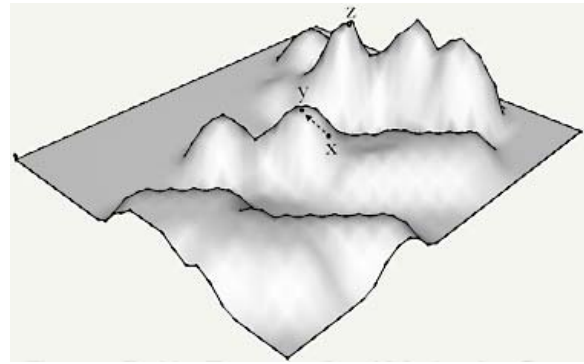


Figure 5. Entities trapped at local maxima in a rugged landscape.

that have the same form as y outcompeting those that move slightly down from the y summit. Therefore, y is a local maximum at which the form is trapped.

In biology, a population of organisms that has reached a local maximum and becomes reproductively isolated is taken to be a species (Sewall Wright 1932; Simpson 1953:155-59). The problem of species or incipient species escaping the traps of local maxima has spawned an enormous amount of theoretical population biology that is beyond the scope of the argument in this essay,<sup>25</sup> but suffice it to say that genetic drift, external perturbation, hybridization, and movement through an adaptive landscape on “ridges” have all been shown to move species away from local maxima traps.<sup>26</sup> For our purposes it is enough to recognize that local maxima serve as attractors in the adaptive landscape, that they *can* trap lineages even though we can see that there are other locations in morphospace with higher fitness, and that some kind of significant change in the environment is required to move the lineage away from the local maximum.<sup>27</sup> Furthermore, since for the most part we examine relatively stable systems that we only notice because they have already evolved to fit their environments, the adaptive landscape at any given time is likely to be populated only at the fitness peaks, giving us the illusion that species or genres were always separate. However, if we trace backwards the movement of lineages in the adaptive landscape, we can see that what are at a given time separate species on distant peaks must have originated much lower in the fitness landscape, and while they were in these flatter locations, they had more flexibility in the evolution of form because flatter morphospace allows for greater freedom of variation. In completely flat morphospace a move in any direction is as fit as the original location. As morphospace becomes more hilly, some moves become superior to the original location, but others become inferior. Thus total variability is lessened as the relief of the landscape increases.

<sup>25</sup> See, among many others, the essays in Crutchfield and Schuster 2003. For applications beyond biology, see the essays in Ziman 2000.

<sup>26</sup> It should be noted that some of these models are controversial; Gavrilets is careful to note dissenting voices. I have found his third chapter particularly illuminating (2004:53-80).

<sup>27</sup> For further discussion, see Perkins 2000.

### Attractors in Morphospace

When we recognize different instances of a multiform as being all in some way “the same thing,” as varying within limits, we are making a *Gestalt* judgment of similarity at multiple and confounded levels of the morpho-semantic hierarchy: an Anglo-Saxon hearer would recognize *Cædmon’s Hymn* in either the *eorðan* or *ylða* forms despite the minor variation in line five. This *Gestalt* recognition of similarity can occur at any level of the hierarchy, from the entire poem to the theme to the type scene, formula, or even an individual word that is “the same” as its synonym. This is not inconsistent with Michael Nagler’s concept of an “underlying *Gestalt*” (1974:18) behind Homeric formulas,<sup>28</sup> but it replaces the linguistically problematic idea of a “preverbal” or “relatively deep” *Gestalt*<sup>29</sup> with the idea that the identification of similarity is based on abstracted qualities. The recognition of fundamental similarity at differing levels of the hierarchy, then, is not limited to the formula, or even to oral traditional works; instead the cognitive processes allow us to say that *West Side Story* is in some way the “same” as *Romeo and Juliet*.

To represent all the different possible types of similarity and difference between the two artifacts, we would need to compare adaptive landscapes in multiple dimensions—a task beyond the visualization powers of our minds. However, if we isolate a given high level, such as the semantic category “love story” or the genre “Broadway musical,” or the tradition “Moslem epic,” we can visualize an appropriate landscape. The “Serbian Christian epic” mountain would be a large peak with many sub-summits that would represent, among others, the multiforms “Kosovo Cycle” and “Stories of Kraljević Marko.” “Little Red Riding Hood” would be a large massif with many large summits, representing related morphologies in different languages and traditions (that is, the similarity would be at different levels of the morpho-semantic hierarchy).<sup>30</sup> Each lineage would have moved up the peak by evolving to be more and more fit to the cultural contexts in which it existed.

The difference between literary works, which are defined by texts fixed at the level of individual words and sentences, and oral traditional multiforms, which are fixed at more abstract levels of morpho-semantic hierarchy, would be visible if we zoomed in further on the summit of the peak. A fixed text of *Cædmon’s Hymn* occupies a single point in morphospace, and even the small variants we have documented only occupy four points. But the “Stories of Kraljević Marko” summit would be made up of smaller sub-peaks: “Marko Drinks Wine During Ramadan,” “Kraljević Marko and Musa the Robber,” and “The Death of Kraljević Marko,” with each of these sub-peaks surrounded by morphospaces representing variations particular to Mujo Kukuruzović or Ibro Bašić and changing even from performance to performance.

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<sup>28</sup> Nagler argues that a poet “takes in many hundreds of lines . . . from all of which he develops an intuitive feel for an underlying *Gestalt* which is retained in his unconscious mind probably in some unknown way that the phrasal impulses of any natural language are retained in the mind” (1974:18-19).

<sup>29</sup> One reason that linguists replaced the phrase “deep structure” with “d-structure” is the persistent mis-equation of “underlying meaning” (which is what Nagler means here) with grammatical “deep structure.”

<sup>30</sup> For more discussion, see Zipes 1993 and 2006.

The geometry of adaptive morphospace shapes the evolution of cultural entities in the same way that hydrodynamics shapes fish, but there is a limit to how much similarity is thus produced. Which local peak a meme-plex evolves toward is a function both of the shape of morphospace and the contingent factors of the history of the particular lineage. Entities within a multiform or within a larger genre are similar in form because the selection pressure to fit the adaptive landscape led them to the same areas of morphospace at various levels of the morpho-semantic hierarchy, but entities that evolved into similar forms are usually (though not always) similar because they have similar ontogenies. Although the forms that have risen up the mountain to reach similar peaks may not have begun at the same spot in the landscape, their passage through any bottlenecks in morphospace on their way to the summit will have forced them to have—at that specific point in time—similar morphologies.

Additionally, the shapes of adaptive landscapes are not static but evolve over time as the populations evolve. This may seem a counterintuitive proposition, as adaptive landscapes represent the full possible morphospace of an entity, but the presence of variously adapted entities in the landscape can make some forms less or more adaptive or open up new areas of morphospace, changing the relative height of different peaks. Changes in population density can affect the fitness of different morphologies: a form that is very fit when there are few same-species competitors can be a handicap in crowded circumstances (Blute 2010:81-83). But although the adaptive landscape changes, at any given time the particular features of a rugged landscape still serve as attractors.

### **The Pull of the Prototype**

As rich and complex as our model to this point is, it has not yet gone beyond biology and so does not account for some dynamics that may be unique to cultural evolution. “*Natura non facit saltus*,” (“Nature does not make leaps”) wrote Darwin, summing up a great deal of observational knowledge. The theory of Natural Selection shows that nature does not *need* to make leaps in form, that all the existing forms in nature can be accounted for by the slow and steady processes of selection, without the need for “hopeful monsters.”<sup>31</sup> Mathematical work on adaptive landscapes has further shown that even seemingly inaccessible peaks can be reached merely through genetic drift, and peaks themselves can shift through stochastic processes (Mayr 1942:54; Carson 1968; Carson and Templeton 1984; Templeton 1980; Kaneshiro 1980; Kaneshiro and Anderson 1989:43-76),<sup>32</sup> so saltations are not necessary for biological evolution. But we do observe, at least from certain points of view, what look like saltations in cultural evolution, or at least the traversal of large areas of morphospace without the visible presence of many intermediate forms. The sonnet having evolved, Shakespeare did not re-invent the form when he wrote his first one, but we also do not view his works as having evolved from any particular individual poem that inspired him. Rather, Shakespeare had the idea of the sonnet, a *pattern* higher in the morpho-semantic hierarchy than any specific string of words. He and other

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<sup>31</sup> For a useful (though partisan in predictable ways) discussion, see Gould 1980:186-93.

<sup>32</sup> For a history see Provine 1989.

poets had recognized the salient features—the generic characteristics—of the sonnet and formed a conception of what a sonnet should be. His individual sonnets evolved in part from features of individual poems but more significantly from the contours of a mental abstraction of a sonnet in his mind.

Mathematically, an attractor is simply a set towards which a dynamical system evolves over time. In an adaptive landscape, it is a location to which the combination of selection with mere stochastic variation will drive the evolution of morphology. But culture-space is not the same as physical, biological space because much of culture occurs in minds, and even though it has at its root a material cause, the mental world operates somewhat differently than physical space. Cultural entities can therefore perform seeming saltations, apparent jumps through morphospace, much more easily than can biological entities. This dynamic complicates the metaphor of the adaptive landscape. For example, impossibly deep valleys can be crossed through the ability of some cultural forms to jump from one peak to another. Because these saltations occur in minds, we must import some specifics of mental processes into the theory. This we can do by drawing on research in cognitive psychology, specifically Eleanor Rosch's classic work on the mind's categorization system and the formation of prototypes in her "Principles of Categorization" chapter (1978:27-48) in *Cognition and Categorization*.<sup>33</sup> Although research has continued on categorization and prototypicality, Rosch's earlier papers have not been superseded, and they lay out very clearly and at the most useful level of detail the processes that are of greatest relevance to the argument presented here.<sup>34</sup>

"Human categorization should not be considered the arbitrary product of historical accident or of whimsy," writes Rosch, "but rather the result of psychological principles of categorization, which are subject to investigation" (1978:27). The perceptual and cognitive systems tend to categorize entities in the same ways even when the humans who are doing the categorization are very different from each other (for instance, if they are from different cultures or backgrounds or are of different ages). The patterns of categorization discovered by psychologists, then, can be used cross-temporally and cross-culturally.

The first principle of categorization is that of *cognitive economy*: "the task of category systems is to provide maximum information with the least cognitive effort," so that an organism can conserve finite cognitive resources. This principle leads to a balancing process, because it is beneficial for organisms both to have large numbers of categories that make fine discriminations and to reduce "the infinite differences among stimuli to behaviorally and cognitively usable proportions." A cognitive system, therefore, will evolve to a middle ground between categories that are too broad and those that are too narrow. The principle of cognitive economy means that elaborated taxonomies are unlikely to be common except in special situations when they are particularly valuable, such as when subtle distinctions can be the difference between eating an

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<sup>33</sup> Although she summarizes her previous work in Rosch 1978, it is well worth reading the earlier studies (1973, 1975a, 1975b, 1975c, and 1977) that led up to it.

<sup>34</sup> In my investigation of research in cognitive psychology I have been guided by Rolf Nelson; errors are entirely my own.



edible or a poisonous plant (Berlin 1978).<sup>35</sup> The second principle of the human categorization system is as follows: *the world is not unstructured*,<sup>36</sup> “the material objects of the world possess a high correlational structure” (Rosch 1978:28-29). The attributes of objects are not uniformly distributed but instead connected to each other in ways that are probabilistic, so that in animals, for instance, wings most often occur with feathers and beaks, less often with fur, and never with scales. The brain has evolved to detect consistent coincidences in the environment,<sup>37</sup> so the correlational structure of objects is readily noted and remembered.

These two principles cause category systems to have two dimensions. The vertical dimension “concerns the level of inclusiveness of the category” (Rosch 1978:27). This is the level along which the terms *corgi*, *dog*, *carnivore*, *mammal*, and *living creature* vary. The horizontal dimension represents the “segmentation of categories at the same level of inclusiveness” (Rosch 1978:27). This is the level at which *dog*, *fish*, *truck*, *chair*, *lake*, and *rock* vary (see Figure 6).

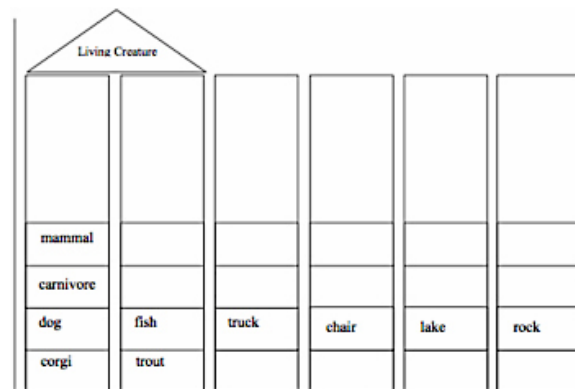


Figure 6. Cognitive categorizations on two axes.

Not all categories along the vertical dimension of categorization are equally useful, so there is selection pressure to choose the category that most effectively mirrors “the structure of attributes perceived in the world” (Rosch 1978:30). Furthermore, to increase the “distinctiveness and flexibility” of the categories in the horizontal dimension, “categories tend to become defined in terms of prototypes or prototypical instances that contain the attributes most representative of items inside and least representative of items outside the category” (Rosch 1978:30). These cognitive prototypes<sup>38</sup> shape the evolution and perception of multiforms.

Under the principle of cognitive economy, categories evolve to be separate and clear-cut, and although it is not always possible to carve the world at the joints, prototypes are those cases in a category in which membership is most clear. Research shows that judgments of typicality are consistent even in regard to categories about whose boundaries the study subjects disagree and also across age, gender, cultural and ethnic categories (Rosch 1974; Rosch 1975a; Rosch 1975b; Rosch 1975c; Rosch and Mervis 1975). Categories are formed by the mind’s judgment of

<sup>35</sup> The research on this topic is beyond the scope of this essay. For an accessible discussion in other contexts, see Davis 1997.

<sup>36</sup> Rosch is quick to note that we are discussing the perceived world as mediated through both the human perceptual system and pre-existing cognitive categories (1978:29).

<sup>37</sup> The neurological basis of the brain’s “coincidence detector” lies in the NMDA receptor, which allows calcium ions to flow only when *both* a pre-synaptic and post-synaptic signal are present (Kandel and Schwartz 1996:284).

<sup>38</sup> Nagler argues that “the aspiring poet . . . does not memorize prototypes or templates” (1974:18). Although they may not explicitly memorize an abstract model, poets think like other human beings and thus must construct mental prototypes of poems and their features in the same ways that individuals construct mental prototypes of entities that are of interest to them.

similarity and difference. Although additional models such as that of Amos Tversky (1977) are also helpful for conceptualizing the abstract process involved,<sup>39</sup> it is enough to follow Rosch's conclusion that category prototypes "develop through the same principles, such as maximization of cue validity and maximization of category resemblance, as those principles governing the formation of the categories themselves" (1978:36-37). Thus prototypes are built at the same time that categories are being developed. Once prototypes exist, subsequently encountered entities are compared to them. At times an individual entity in the real world may be a very close match for the prototype (a robin may seem like a prototypical bird), but the mental entity is not the same as the physical one.<sup>40</sup> The more prototypical a category member is, the more features it has in common with other members of the category (Rosch and Mervis 1975), and when it is possible to measure prototypes in terms of size or other objective metrics, prototypes tend to be at the mean of the other entities in the category (Reed 1972; Rosch et al. 1976). "Prototypes appear to be just those members of a category that most reflect the redundancy structure of the category as a whole" (Rosch 1978:37).

### **Prototypes, Influence, and the Adaptive Landscape**

We can integrate this cognitive psychological research with our previous analysis by noting that prototypes will evolve to be like the forms at the peaks of the adaptive landscape, and having been constructed, they in turn influence subsequent evolution. If entities are clustered at various local maxima around an adaptive peak they will, due to their relative positions in morphospace, share many features. The entities closer to the summit should share the most features because these features are individually closer to each other than to any of the more widely distributed forms. Entities residing at the peaks of adaptive landscapes thus become attractors in two ways. First, they occupy those areas of morphospace that are most fit and therefore are the forms towards which other entities are evolving (although these other entities may, at any given time, be trapped on local maxima). Second, because the peak forms are the most likely to become prototypical, all other forms that are perceived as being part of the same category<sup>41</sup> will be compared to those forms. For the purposes of pure categorization this standard of comparison does not seem particularly important, but because cultural evolution relies on the production and transmission of new forms from human minds, the prototype serves not only to categorize but also to create new forms in a particular shape. The seeming saltations we find in human culture can thus be explained by noting the pull of the prototype, to which evolving forms are compared and which thus shapes the evolution of those forms.

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<sup>39</sup> Tversky's model is the subject of an enormous amount of research and is beyond the scope of this argument; see further Dehaene 2009:176-93.

<sup>40</sup> It seems to me that the psychologists may have independently reinvented Ferdinand de Saussure's idea (1983) of the "signified" that exists only in various minds; this is not the only place where there is some overlap between cognitive psychology and (albeit outdated) theoretical linguistics.

<sup>41</sup> Generally, but not always, these forms are in a proximate part of the adaptive landscape—otherwise they would not be in the same category.

Figure 7 represents the first stages in this process. We begin with the multiform A, which is produced by some participant in an oral tradition. (almost any multiform in which we are interested will not have arisen *ex nihilo* or even *de novo*, but for the purpose of this argument, let us assume entry into a new area of morphospace.) Some of the features of this multiform are judged to be salient by human cognitive processes, and out of these salient features begins the evolution of a prototype,  $\alpha$ . Another distinct but in some ways similar multiform, B, has some features that are similar to A but others that are different. If the *Gestalt* of B is similar enough to A for the two entities to be classified in the same category (as they would be if they share enough features), then features of B are also abstracted, but instead of forming a second prototype, the abstracted features of B further shape prototype  $\alpha$ , which remains the prototype for the entire category, not just for multiform A. Prototype  $\alpha$  will now include the shared and salient features of both A and B. As participants in a tradition experience performances C and D, they will abstract additional features from these performances and recognize patterns—this information will in turn influence  $\alpha$ . Let us assume that this particular prototype is held in the mind of an author who is now generating a new song. That new form,  $\aleph$ , may have some features of multiforms A, B, C, or D, but only via the prototype,  $\alpha$ . This model can be made more detailed and complex by allowing an individual entity to provide primary stimulus but having that primary stimulus be mediated through the already existing prototype, to which are added various feedback loops (see Figure 8).

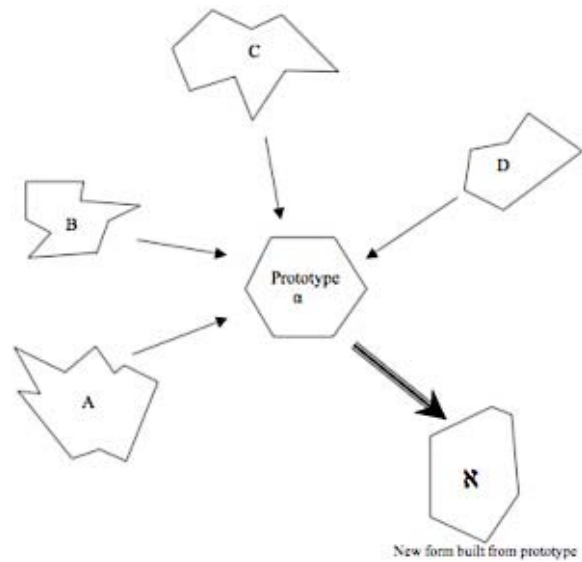


Figure 7. Influence model – oversimplified.

The key point is that the movement from A-D to  $\alpha$  and then from  $\alpha$  to  $\aleph$  is the way that the influence of the cognitive prototype works through the mediation of the human mind. From the point of view of an outside observer, the generation of a unique performance in a given tradition may appear to be a saltation: one small stimulus—perhaps hearing that United States President John F. Kennedy was assassinated<sup>42</sup>—

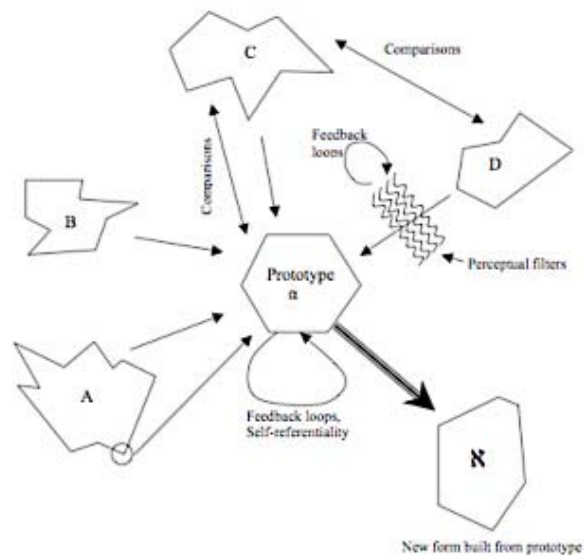


Figure 8. Influence model.

<sup>42</sup> After the Kennedy assassination, Jozo Karamatić, a guslar from Herzegovina, composed and recorded “Smrt u Dalasu” in the epic style. Although the performance was recorded in audio only, there are now many on-line versions available in which the song is used as a soundtrack to imagery of the Kennedy assassination. One of the less sensationalistic versions is available at <http://www.youtube.com/watch?v=qha-q9Wr9FI>.

provokes the creation of a large and complex work that is somewhat different from the large and complex works that have come before. We can see why observers might think that something magical happened inside the human brain or that the process was simply too complex to explain or that the prototype generated spooky action at a distance. But when we recognize that there has been significant information transfer from the world to the mind—in the categorization of entities and the creation of prototypes—the seeming poverty of the stimulus is no longer a problem. A given work or event may be the proximate cause of inspiration, but the matrix in which that work exerts influence is the long-term building of cognitive categories, the evolution of mental prototypes in the adaptive landscape.

For these processes to work, however, entities A, B, C, and D must be similar enough in perceived features for the mind to try to categorize them together and build a prototype from their shared features. Such similarity can be caused by homology, analogy, or random chance. *Homology* is similarity caused by shared inheritance. The seven neck vertebrae in most mammals from shrews to pigs to giraffes is an example of homology: an ancestor had seven neck vertebrae, and the path through morphospace for longer necks has involved increasing the size of each of those bones rather than growing additional ones (except in the case of the sloth). Homology among cultural entities arises when they have common ancestors: their lineages have moved them through the same areas of morphospace. *Analogies* occur when the external world forces a particular shape on an entity. The aerodynamic properties of the wings of birds, bats, and pterosaur are the same not due to shared descent, but because the laws of gravity and aerodynamics admit no exceptions, so that any creature that flies will have wings with essentially the same cross-section. The fitness constraints force the form.

The human mind is quite happy to lump together both types of similarity (and so taxonomists must often struggle to separate homology from analogy in order to classify animals phylogenetically). The principle of cognitive economy ensures that categories will be created around the most visible and distinct features, so prototypes are based upon common features regardless of their ontogenies. The mind builds the prototype from all things that are similar in morphology, and once the prototype is built, subsequent cultural evolution will be based to a degree on that prototype. This process allows variation in non-diagnostic categories to enter the chain of transmission, as unrelated entities are treated as part of the same categories, but it also smooths out variation, as characteristics not consistent with the prototype are less likely to be passed through into a subsequent generation. The interaction of these competing processes helps explain both the “variation” and “within limits” characteristic of oral traditional multiforms.<sup>43</sup> Smoothing is also facilitated by the sharing of prototypes throughout a culture. Although each prototype in each mind may be unique in its fine details, psychological research shows that there is a great deal of inter-personal agreement as to the characteristics of the prototypical members of categories. This shared representation requires only a shared set of cognitive capacities coupled

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<sup>43</sup> Similarly the principles of *communicative economy* and *metonymy*, phenomena well known in oral tradition studies, have the capability both to add variation and to smooth it away depending upon the particular circumstances. Metonymy can cause a variant form to be incorporated into a category if the aspect of the entity that is functioning as a metonym is the same in the entity and the prototype even when the entity as a whole is significantly different from the prototype. However, because *pars pro toto* metonymy can transfer not the particular variant form but instead a stereotyped version closer to the known prototype, this kind of transmission can remove variation as well.

to the error-correction mechanisms of social interaction: humans cannot directly share their prototypes, but they can share characteristics of prototypicality by communicating, both directly and through responses to observed behavior.

To be communicated, a prototype must be converted from whatever abstract set of features is stored in the mind to some form that can be transmitted verbally, visually, or otherwise: this is the point in the process where we are able to observe instantiations of the multiform. The form that is communicated is likely to be that of a real-world example that is as close as possible to the abstract mental prototype. Communication and interaction will produce selection pressure for instantiations to be similar to the features shared in the prototypes of multiple individuals because these are indirectly compared in the production and reception of multiple performances. Correction through communication only goes so far, however; *idiolects* persist in both language and culture.<sup>44</sup> Thus, even evolution towards adaptive peaks plus the categorization system's tendency towards prototypicality does not eliminate all variation from the culture (which, unsurprisingly, provides the variation that allows the system to continue to evolve). The prefix "multi-" is attached to "multiform" for a reason.

### Variation within Limits

The shape of oral traditional morphospace at any given time includes various peaks in the adaptive landscape. Oral traditional multiforms evolve towards these attractors, moving up the peaks but at times getting trapped at local maxima. Once some number of multiforms have arrived at local maxima near each other, such as on the foothills of an adaptive peak, these multiforms are likely to be compared to each other and categorized. (They were similar to begin with as they were evolving in similar regions of morphospace.) When the multiforms are categorized together, a prototype is constructed from their features. This prototype can be represented as an entity just above the adaptive peak for the particular region of morphospace, which in turn remains above the other multiforms, on the lower slopes of the peak (see Figure 9). There is a gap between the highest

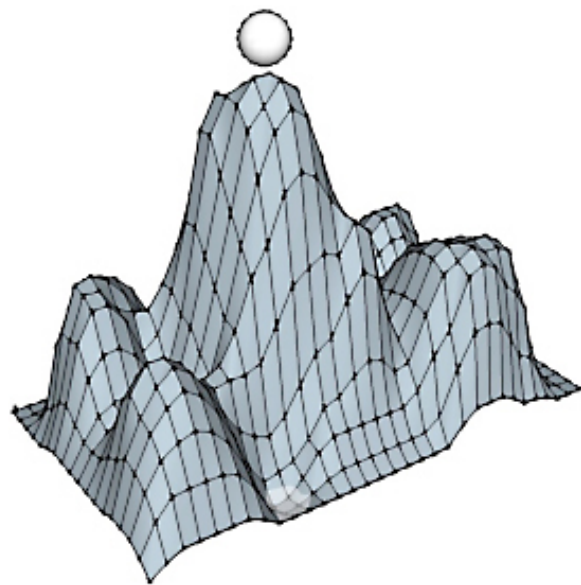


Figure 9. A cognitive prototype (represented by the sphere) influences the shape of an adaptive landscape.

<sup>44</sup> The existence of so-called "mondegreens," song lyrics or collocations that are misunderstood and then remembered and even re-transmitted in incorrect form (regardless of how ridiculous the form is), demonstrates that the perceptual system not only allows for but also creates a certain amount of variability (Sylvia Wright 1954). A surprising feature of the perceptual and mnemonic systems seems to be that once a lyric is misheard one way, it is very difficult to un-hear or re-hear it.

point in the landscape and the prototype because no single instantiation is a perfect match for the cognitive construction.

Selection pressure drives multiforms to evolve towards the morphology of the prototype, thus moving lineages into the higher fitness regions of morphospace. But because real-world instantiations are unable to become the prototype in all details, existing multiforms are trapped on local maxima. New multiforms, however, can enter the adaptive landscape without being influenced directly by any of the existing multiforms, instead being influenced only by the prototype. Some of these can potentially jump to the top of the adaptive peak without being trapped at a local maximum, but there is no particular reason for the multiforms at the local maximum to go extinct (nothing is out-competing them in their local morphospace, since nothing in local morphospace has higher inclusive fitness than the entity at the local maximum) and so they remain as a cluster at the top of the peak below the prototype. This cluster of multiforms—the local maxima surrounding the prototype at the higher maximum—is the population of multiforms for a particular tradition.

Cultural entities are not alive. They may evolve in ways *analogous* to biological evolution, but they do not behave in precisely the same way. Multiforms do not go out and replicate on their own once released into an environment. They must be replicated by human beings, and although this replication can be unconscious, it nevertheless is not independent from human agency. Therefore, in order to be replicated and to create an evolving lineage, cultural entities must somehow be perceived. One good way to be noticed is to be distinctive, but being distinctive means varying from the prototypical form of the multiform and thus potentially being less high up the peak of the adaptive landscape and hence less likely to be replicated. There is a balance to be found between fitting in and standing out. Be too similar to the existing population and you will not be noticed enough to be replicated, but be too different and you do not fit into any existing category and thus cannot take advantage of that category's prototype. So although there is continual selection pressure to be like the prototype, there is also pressure to retain some distinctiveness in each multiform: variation, but within limits.

These dynamics, closely analogous to the dynamics of speciation, create pressure for multiforms to maintain distinctiveness. The areas between attractors in the larger landscape are swept clear of other forms as these are pressured toward one or another of the attractors. Thus, in fully mature multiforms or well-evolved genres we do not see a smooth gradient of varying forms spreading across a flat adaptive landscape, but instead entities clustered on separate peaks (though these will have sub-summits). If a multiform enters a new area of the adaptive landscape, there is likely to be a *radiation*, a proliferation of new forms as entities rapidly diversify to fill new niches. The particular form that enters the new area of the landscape may do so based only on contingent, historical, or even random factors, but once it is there the regular processes of radiation, speciation, and evolution towards peaks in morphospace will work, limited by the original material, to shape the resulting entities. After radiation there will also be consolidation into a reduced number of stereotyped forms, a pruning of the copiously branching bush (Gould 1991).

The populations of multiforms that we observe, therefore, will appear discontinuous for three reasons. First, the pressure on multiforms to differentiate from each other will produce a gappy, island-like landscape, with clusters of entities around the attractors. Second, at any given



time we will not see all the intermediate stages through which multiforms moved through the adaptive landscape. The “fossil record” of culture, particularly before widespread writing and recording, is sparse indeed and very few forms have ever been preserved. Only with recent developments in recording technology—and, perhaps equally important, intellectual developments valuing multiformity—have we begun to attempt to capture and preserve a full range of variant forms (see Honko 1998; Foley 2004). So when we look at multiforms in an adaptive landscape, they may appear to be separate islands, with, for example, wisdom poems being separate from epics which are also separate from elegies and from religious praise poems. But like the islands in an archipelago, entities that appear discontinuous on the surface are indeed linked below as is evident when viewed from a different vantage point.

Third, cognitive processes of creating and then matching to a prototype emphasize separation in order to make the categories more clear-cut. Psychological systems have evolved to detect patterns that are “meaningful” in the sense that the information

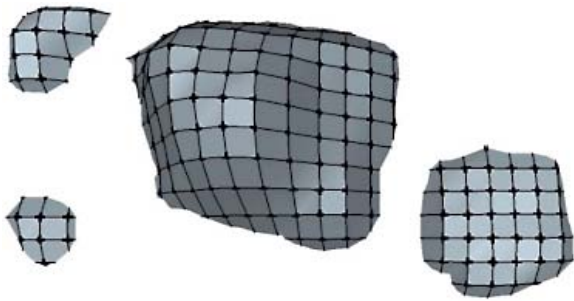


Figure 10a. At a given time, regions of adaptive morphospace appear discrete.

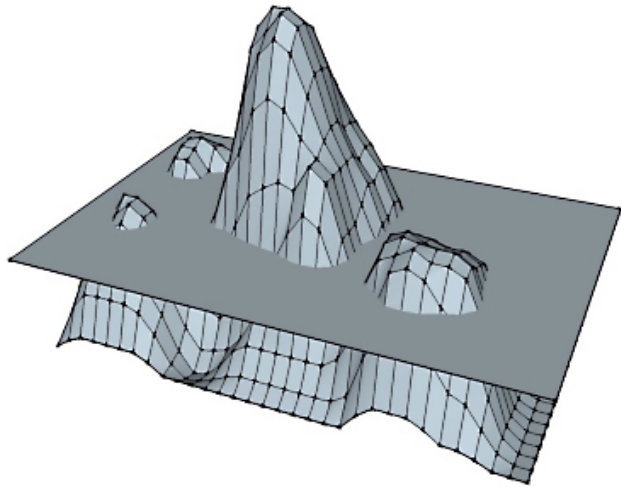


Figure 10b. Areas of morphospace that appear discrete during a certain time interval (represented by the “sea level”) are historically continuous.

detected is valuable for the organism and has good word-to-world fit. However, this large-scale development can be exploited by entities that themselves evolve to fit into the existing psychological tendencies: being like a prototype tends to cause a particular multiform to be reproduced—subject to the constraints of a dynamic balancing between fitting in and standing out. So we have co-evolution of lock and key, with various forms of selection pressure shaping the multiforms and the very existence of the particular multiform re-shaping the morphospace, which in turn changes the selection pressure. The existence of similar entities creates categories and prototypes, which are then attractors. This feedback loop leads to increasing complexity as lineages ramify through cultural space and interact with each other. The cultural ecosystem is shaped both by these consistent processes and by historical and contingent events, some of the effects of which are amplified by the ways they change adaptive morphospace.

Within that landscape, a multiform is a related population of cultural entities that are recognized as being fundamentally “the same” by the categorization systems of the human mind. Depending upon particular cultural contexts, these entities are not always identical at the level of individual words (the level that print-centric individuals often intuit as a requirement for

sameness), but are instead similar at different levels of the morpho-semantic hierarchy. This similarity has developed both by homology, when the entities have evolved to similar positions in the adaptive landscape and thus have similar features, and by analogy, when the entities were shaped by selection pressures to be like their prototypes and thus have similar features.

In examining and discussing a multiform, we can choose a particular level of the morpho-semantic hierarchy at which we compare various entities or different performances. Or we can select a particular individual performance as a representative of the entire multiform in the same way taxonomists select a type specimen for a species. Or we can construct an abstraction, an ideal case that may never have existed in that exact form, a new prototype based on our observations of various individual entities. We do all of these things because our minds have trouble thinking of a large, varying population in all its diversity. But if we reconceptualize that population as an adaptive landscape, shaped by a cognitive prototype and containing variation that is constrained by morphospace around certain peaks, we may be able to harness our intuition to understand better the multiform nature of oral traditional entities. A central question of all studies of tradition is why traditions vary only within limits even while the world around them changes. In investigating the structure, dynamics, and evolution of the multiform, we begin to see why we can recognize continuities of tradition across physical and temporal boundaries, and why traditions, despite being made of only thought and sound, persist through the centuries.

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