A Method for Measuring the Motion of Culture

Greg Urban

ABSTRACT Beginning with Edward Tylor's (1889) definition of *culture* as socially "acquired," I focus in this article on motion as social acquisition and transmission through "artifacts"—both durable (like ceramic pots) and fleeting (like sounds). Motion can be detected by comparison of the artifacts to which people are exposed with those they in turn produce. I examine rates of interaction with artifacts and changes in rates as evidence of the operation of "forces" such as interest and metaculture. I develop a set of axioms or laws of motion, growing out of fine-grained research on naturally occurring discourse, and endeavor to demonstrate their utility through application to three empirical cases. Although I deal with relatively small-scale artifacts, I conclude this article with the suggestion that its methods may prove useful in the broader study of cultural phenomena.

Keywords: culture, motion, laws, metaculture

The idea of "motion"—albeit often assumed, rather than studied—has fueled anthropological imagination since the 19th century. In Edward Tylor's celebrated definition, *culture* included all "capabilities and habits acquired by man as a member of society" (1889:1). Motion appears as social acquisition or learning, the movement of "capabilities and habits" between people. Movement across the generations via learning is what serves to differentiate "culture" from both instinct and individual learning, an idea present in one way or another in most of the definitions found in the collection by Alfred Kroeber and Clyde Kluckhohn (1952).

The idea of motion inspired diffusionist thought about transmission resulting from proximity of people in space. The idea took shape in Johannes Schmidt's (1871) "wave theory," in which linguistic innovations spread through space in concentric circles from a central point (see Labov 2007 for a recent discussion). It also formed the basis for Fritz Graebner's (1911) "culture circles," which in turn bore similarities to the "culture-area concept" (Wissler 1927) in the Americanist tradition (see Henrich 2001 for a recent study). Motion is central as well in globalization research today, as in Arjun Appadurai's (1996) formulation of "global cultural flow," taking place "in and through" media, migration, finance, and technology. In linguistic anthropology, it has taken on new life in Michael Silverstein's (2005) "interdiscursivity" and Asif Agha's (2007:67ff) "speech chains."

My purpose in this article is to outline a method that may prove useful for investigating the motion of cultural elements, such as stories, songs, ceramic styles, and words. The method consists in positing a set of axioms or "laws" and then using these to reason about or interpret empirical data. This is not the sort of thing many cultural anthropologists these days find appealing, but I hope to show that it may be of use in illuminating at least some aspects of culture: in particular, how and why these elements travel across generations, how and why they move laterally between people and even around the globe, and what forces bring about or retard their motion. My illustrations of the method draw on data most familiar to linguistic anthropologists—stories, songs, and lexical items—but my hope is that the method will prove of use to students of culture more generally.

The "measurement" of motion, as I attempt to show, is made possible by the view of culture summed up in the laws. My claim is not that these laws are God's truth. In fact, others may come up with alternative laws, thereby opting for different methods. Rather, I posit that the general procedure of positing laws of motion and reasoning from them about empirical data may help future researchers to explore some of the fundamental questions raised by the phenomena of social transmission and social learning. Hence, I propose "a" method—as a sort of hypothesis—rather than "the" method for measuring cultural motion.

THE PARTICULATE BASIS OF MOTION

What are the basic particles of cultural motion? Tylor suggested they were "habits and capabilities." In diffusionism, the particles were thought of as cultural "traits": ceramic styles, writing systems, myth themes, beliefs, and so forth.

AMERICAN ANTHROPOLOGIST, Vol. 112, Issue 1, pp. 122–139, ISSN 0002-7294 online ISSN 1548-1433. DOI: 10.1111/j.1548-1433.2009.01201.x

However, such traits proved to be less solid than early researchers imagined. They appeared, in fact, to be reshaped by the new social contexts into which they entered. Consequently, Ruth Benedict (2005:47) proposed that "cultures" were "more than the sum of their traits," leaving us with something like the culture of a group as the basic "particle" of motion. Instead of individual traits moving through space, whole cultures moved through time. With the structuralist turn in the mid–20th century, attention shifted to binary oppositions—invariant principles underlying the apparent surface flux of culture. This development temporarily shelved concern with the units of motion.

Once history was reintroduced into the structuralist paradigm (Sahlins 1978, 1985), "events" appeared as crucial junctures in the flow of culture through time. Shaped by and manifestations of what came before, they were also subject to material forces and risk (Keane 1997). Hence, they could redirect and reshape culture. Underlying structure, thus, stood in tension with event; so although events might "actualize" structure, thereby perhaps representing vehicles if not units of motion, they also resulted in as re-arrangements of structure. As Marshall Sahlins put it: "Culture is historically altered in action" and "the alteration of some meanings changes the positional relations among the cultural categories" (1985:vii).

Generalizing the type versus token distinction from linguistics, elsewhere I proposed that cultural "elements," such as stories, could be viewed as housed, however fleetingly, in "objects" or artifacts accessible to the senses (Urban 2001). The elements are malleable, undergoing change as they move through the world, shaping but also being shaped by the artifacts through which they are transmitted. The element versus object contrast bears an analogical relationship to Sahlins's culture versus event distinction—although the objects posited are, more transparently, the vehicles of or transport mechanisms for culture. One could construe, for example, the unique utterance of a story at a given time as an "event," the learned and repeatable form of the story as the "culture"; correspondingly, one could construe utterance as "object" or artifact and its repeatable form as "element."

However, it is also the case that an object, to be picked out as an object, depends on the signs through which it is apprehended. Accordingly, writes Webb Keane, "it is a historically specific semiotic ideology that determines what will count for the interpreter and actor as objects" (2003:423). Although he does not use the concept of "semiotic ideology," Bill Maurer raises similar questions about a copper mine in the British Virgin Islands, which, he argues, was in the late 19th century "a qualitatively different object from the copper mines of the middle- and late-20th century" (2000:673). He explains that "different sets of discourses congealed . . . in the objects called the copper mine in different historical moments" (Maurer 2000:673).

Taken to an extreme, the valid insight of such points of view might lead one to conclude that the reproducible units of culture are "ideologies" or "sets of discourses"—a position not unlike Benedict's earlier view that the reproducible unit was "culture" itself, taken as a discrete and bounded entity, a view called into question by critiques of the sharedness of culture. To retain the valid insight that interpretive practices help to constitute what are taken as objects while avoiding the all-or-nothing sharedness problem, Urban (2001) developed the concept of "metaculture"—culture that is about culture. The units of metaculture are as problematic as those of culture generally, but the metaculture–culture relationship serves to capture the shaping and also shaped by characteristics of culture.

Because the metacultural and cultural layers are not inextricably fused, it is possible for them to part company and travel somewhat independently. For example, while mass-media images, as cultural artifacts, may influence possible interpretations of themselves, they do not uniquely determine them. Therefore, the circulation of such images may result in different interpretations becoming attached to them. Tom Boellstorff, for example, used the term "dubbing" to describe a process in Indonesia whereby "a set of fragmented cultural elements from mass media" in Western societies was "transformed in unexpected ways in the Indonesian context, transforming that context itself in the process" (2003:236). There is a parallel here to the classic account by Laura Bohannan (1966), in which her telling of Shakespeare's *Hamlet* to elders of the Tiv nation of West Africa produced a startling interpretation. Unlike the Indonesian subjectivities described by Boellstorff, however, we do not know whether this new fusion of metaculture to culture became a replicable element circulating within Tiv society.

The oft-quoted line by Clifford Geertz—"culture is public because meaning is public" (1973:12)—assumes that meaning has made its way through the world; it has traveled between people over time, even in some cases across generations. This must be true also of the interpretations that determine "what will count . . . as objects" or artifacts—and, hence, what will be replicable. They must travel between people. To be communicated, however, meaning depends on "publicly accessible" signs, traceable ultimately to material, sensible sign vehicles (Urban 1991). As Agha notes: "Utterances and discourses are themselves material objects made through human activity—made, in a physical sense, out of vibrating columns of air, ink on paper, pixels in electronic media" (2007:3). Mass-mediated utterances—including writing and electronic recordings—achieve a temporal stability comparable to that of other physical objects, differing from what is ordinarily regarded as "material culture" principally because the physical properties of the artifacts are often overlooked by native speakers, although those properties come to the fore in the case of stylized speech, including song (Urban 1991).

The necessity that culture—to move between people—be externalized in publicly accessible signs or "artifacts" suggests one way to conceptualize the particles of motion problem. The learning of culture depends on exposure to

artifacts produced by others: sounds, behaviors, physical objects, and so forth. The transmission of culture in turn depends on the production by people of new artifacts bearing some relationship—possibly complex—to those to which they have been exposed in the past. Although attention must be paid in specific ethnographic contexts to what counts as a replicable artifact, one answer to the particle question is that the particulate bases of motion are sensible artifacts. Insofar as the artifacts produced by individuals bear a relationship of recognizable similarity to (up to identity with) the artifacts to which they have been exposed, we have evidence that culture has moved through the world. An "ideology" or "set of discourses"—or even one of Benedict's whole "cultures"—may exhibit such demonstrably replicable properties and, hence, constitute a sort of complex element of culture. But such units can also, simultaneously, consist of smaller elements, capable in some measure of independent trajectories through the world.

LAWS OF CULTURAL MOTION

In this article, I treat culture as something transmitted through human artifacts, whether ceramic pots, sounds, behaviors, or media images. Social learning of "habits and capabilities" is made possible by interaction with or exposure to the artifacts produced by others. The more people interact with the artifacts produced by others (sounds, behaviors, physical objects, mass media images, etc.), the more of the culture of those others they acquire. The acquisition of culture is a gradual process, unfolding in time, and exhibiting the principle of proportionality to exposure time.

A second proposal I make is that cultural motion exhibits an "inertial" property. In other words, the existing rates of interaction with artifacts or artifact types tend to remain constant over time unless some "force" is exerted to change that rate. For example, a given ceramic style that is produced and consumed within a group will tend to be produced and used at the same rate unless something happens to disturb the existing state of affairs. If a story is told with a certain frequency, it will continue to be told with that frequency unless other forces intervene.

If a story is not told—that is, if there are no interactions with its textual artifacts—then the story is not in motion. It may still be "culture," insofar as it was once in motion—that is, socially learned and transmitted. Such has been the fate of countless indigenous cultural elements as Western culture has spread around the globe, with revitalization movements later bringing some of them back to social life. There is also what might be termed *potential culture*: that is, cultural elements that could or will in the future come into circulation—future cultural innovations.

That the interaction rates with artifact types do not always or even usually remain constant over time was recognized by the great pioneer of anthropology, Alfred Kroeber (1916). Surveying potsherds found in Zuñi Pueblo in the southwestern United States, Kroeber formed a hypothetical historical sequence for the region. In his reconstruction, ceramic styles were found to rise in frequency over time—indicating a rise in rates of interaction with that style of artifact—and then decline. For example, "corrugated ware preponderated in the very earliest epoch, and diminished through all periods until it has died out in the present" (1916:15). In his reconstruction, there was, thus, a decrease in frequency of interaction with corrugated ware over time in Zuñi Pueblo. The all-things-equal inertia formulated above did not obtain.

In a similar vein, and demonstrating that the 1916 study was not a passing interest, Kroeber (1919; see also Richardson and Kroeber 1940), based on measurements made of illustrations in magazines from 1844 to 1919, demonstrated regularities in the change over time in women's fashion. Among other things, he found that skirt widths were about 57 percent of body length in 1844. The percentage rose gradually at first, as skirts got wider, and then accelerated after 1851, reaching a peak in 1859 of 116 percent of body length. Dresses then became narrower, albeit with fluctuations, reaching an average of 33.2 percent of body length in 1919. If we construe skirt width in relation to body length as an index of the artifact types to which people were exposed through this mass-media venue, it appears that the rates of interaction with a given type changed over time. Exposure to or interaction with wide skirts became more common from 1844 to 1859 in fashion images and diminished thereafter.

Observations such as Kroeber's, along with others reported below, led me to wonder about the possibility of measuring the forces at work on cultural motion by studying the extent and rate of change in interaction frequencies with artifact types. This led to a third proposal: namely, that change in the rate of interaction with an artifact type is proportional to the force applied to the culture contained in it; the greater the force, the greater the change in frequency of interaction.

In endeavoring to formulate a method for measuring motion, I developed these three proposals as axioms (or "laws") for reasoning about empirical phenomena. The three may be summarized as follows:

> Law 1: The transmission of culture is proportional to the interaction time (Law of Transmission).
> Law 2: Culture that is already in motion tends to stay in motion at the same rate (that is, to be transmitted at the same rate) unless it is acted on by some other force (Law of Inertia).
> Law 3: The displacement of cultural motion is proportional to the force applied (Law of Force).

In the remainder of this article, I offer three illustrations of the method, using the axioms to reason about the data and the forces at work.

THE CASE OF STORY REPLICATION

The telling of a story, as an externalized "cultural object" or artifact, is a specific concrete instance of narration. Such artifacts are the particles or vehicles of cultural motion. A story as a "cultural element," capable of being passed

across the generations or between people over stretches of geographical space, however, typically requires recognizable similarity between multiple artifacts—that is, between multiple tellings and retellings. I found myself intrigued, during my research in Brazilian Indian communities in the 1970s and 1980s (Urban 1991:79 ff), by the similarities and differences in wording of different tellings of what was regarded as the "same" story. The similarities were especially revealing of motion when the tellings were separated in time by a number of years.

This led me to search for ways to measure the similarity. My first clumsy attempts consisted in comparing the actual words found in the tellings (Urban 2001:76–83). Even these crude attempts revealed unmistakable similarities between tellings of the "same" myth. However, I found the technique too coarse for fine-grained study of motion, in part because any two stories told in the same language will exhibit similarity just because some words, especially grammatical words, occur with such high frequencies. To refine the technique, I began to study similarities between tellings by the comparison of word triplets—a triplet consisting of a given word, the word immediately preceding it, and the word immediately following it. Given the low probability that two unrelated stories would share a significant percentage of triplets, the technique allows for fine-grained study of similarity between story artifacts—and, hence, a fine-grained study of motion.

Stories are generally listened to and retold because they generate interest, and I want to suggest that interest is one key force driving the motion of culture. However, my Brazilian research showed clearly that it is not the only force. Motion can also be driven by metaculture. If "culture" is taken to be whatever is socially learned and socially transmitted, then "metaculture" is culture—but culture that is specifically about culture. In the case of the origin myth telling described in Urban 1991, the metaculture consisted of widely circulated discourse to the effect that the origin myth had to be learned word for word, syllable by syllable—lest bad consequences ensue. This is an example of metaculture picking out the artifact to be replicated: in this case, the word-for-word text artifact to which the replicator is exposed.

This led me to undertake experiments in metaculturally induced word-for-word replication, one of which I describe here. Might I, or other researchers, on analogy with Brazilian indigenous-community elders, be able to bring about instances of cultural motion by requesting that selected individuals endeavor to repeat word for word a story to which they have been exposed? Most of the experimental work was actually carried out by research assistants who drew on networks of college friends and acquaintances. The Brazilian elders relied on the discourse of ill consequences should individuals fail to learn the origin myth with syllable-by-syllable fidelity. We relied on the desire by students to perform well—although they were told this was not an intelligence test—and also on a token payment of money, which was metacultural insofar as it was transmitted and received with the explicit understanding that it was in exchange for endeavoring to retell the story.

The experiment went as follows. I audiotape-recorded a story narrated by individual A. The story was then played back for individual B one time. The amount of time a single turn takes is t. B was instructed to retell the story word for word as precisely as possible, and B's version of the story after Turn 1 was tape-recorded. The procedure was repeated a second time, so that the interaction time with the original narrative was now 2t, and a third time so that the interaction time was 3t, and so forth through 30t. All tape recordings were transcribed and compared against the original.

For this experiment, I made use of a story that was actually the fourth iteration in a chain of renarrations in a separate telephone-game experiment.[1] Here is a transcription of that story, including only full English words and no "ums" or "uhs":

> There once was a grasshopper and an ant. The grasshopper was very lazy and the ant was constantly doing all the work. During the day the ant would be working and the grasshopper would be drinking vodka gimlets while the ant continuously worked. One day one day the the ant well actually the grasshopper never searched for food while all the while the ant continued continued catching rotten raccoon carcass. So one day the grasshopper goes up to the ant and asks the ant if he can have some of his food and the ant says yes. However a group of Boy Scouts comes and causes some rocks to fall on both insects and kills them both, and of course this was a very unwise financial decision because who knows what could have been gained by having two talking insects.

Because the text contains 140 words, a perfect copy would contain 140 matching triplets.[2] The copies, as artifacts, could be regarded as similar (from the point of view of word composition) in proportion as the number of triplets matched. By way of example, if the original contained the sequence "was very lazy" and the copy also contained that exact sequence, this counted as one match. By comparing the number of matches over time, I had a way of measuring transmission in this case.

Even before carrying out a single experiment, I had reasoned from the "laws" summarized above as to what I might find. Here is my reasoning: If, after one narration, B is able to reproduce say 20 percent of the triplets from the story, then—assuming the rate of transmission remains constant because the same interaction time is involved (Law of Transmission)—after two narrations B ought to be able to reproduce 20 percent of the triplets plus 20 percent of the remaining 80 percent of the triplets—that is, 36 percent of the total. After three narrations, the person ought to be able to reproduce 36 percent plus 20 percent of the remaining 64 percent—or 48.8 percent—and so forth. After 30 narrations, transmission approaches the limit of 100 percent. The curve described by this theoretical transmission, based on attempted deductive reasoning, is represented in Figure 1.

The general formula is:

$$T_{t=n} = T_{t=n-1} + (N - T_{t=n-1}) \times R,$$

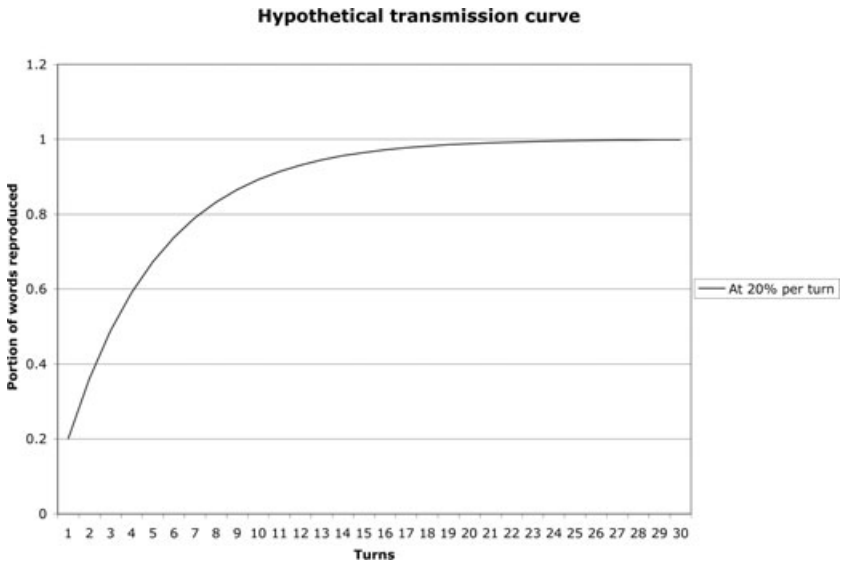

FIGURE 1. *Chart depicting the hypothetical transmission of a story, where transmission is understood as verbatim replication.*

where T = Number of triplets acquired at time t = n; N = Total number of triplets in the original; and R = Rate of transmission. For the initial turn, because $T_{t=n-1} = 0$, $T_{t=1} = N \times R$.

The story, as a complex artifact transmitted through repeated listening, is heard in its entirety. What has already been acquired is heard again (and the acquisition solidified), while what has not been acquired is acquired through subsequent rehearings at the same rate. Part of the interaction time in subsequent hearings is devoted to retransmission of what has already been acquired. The remainder of interaction time is devoted to the part of the narrative that has not been previously acquired.

Figure 2 graphs the actual data and theoretical predications from one instance of this experiment: ten were used for this article.[3] The horizontal axis measures turns (interaction time), and the vertical axis the number of matching triplets (transmission), in this case the maximum being 140. The theoretical graph, based on the Law of Transmission, assumes a rate of 16.6 percent. It also assumes a maximum transmission of a little over 97 percent of the total possible, for reasons that will become clear subsequently. The charts for the other instances resemble this one, although the rates of transmission vary and there are other factors that, although making sense in terms of the laws, I cannot delve into here.

To give a sense of how a small fragment of culture is gradually acquired, I transcribe below the second sentence of the original and the copies produced by one individual:

Original:
The grasshopper was very lazy and the ant was constantly doing all the work.
Replica turn:
1. The ant was very hard working and the grasshopper was lazy.
2. The grasshopper was very lazy but the ant was hard working.
3. The grasshopper was very lazy but the ant was hard working.
4. The ant was hard working but the grasshopper was very lazy.
5. The grasshopper was very lazy but the ant was hard working.
6. The grasshopper was very lazy but the ant was hard working.
7. The grasshopper was very lazy and the ant was hard working.
8. The grasshopper was very lazy and the ant was hard working.
9. The grasshopper was very lazy and the ant was continuously working.
10. The grasshopper was very lazy while the ant was continuously working.
11. The grasshopper was very lazy while the ant continuously worked.
12. The grasshopper was very lazy and the ant was constantly working.
13. The grasshopper was very lazy and the ant was constantly working.
14. The grasshopper was very lazy and the ant . . . and the ant was constantly doing all the work.
15. The grasshopper was very lazy and the ant was constantly doing all the work.
16. The grasshopper was very lazy and the ant was constantly doing all the work.
17. The grasshopper was very lazy and the ant was constantly doing all the work.
18. The grasshopper was very lazy and the ant was constantly doing all the work.
19. The grasshopper was very lazy and the ant was constantly doing all the work.
20. The grasshopper was very lazy and the ant was constantly doing all the work.
21. The grasshopper was very hard working sorry the grasshopper was very lazy and the ant was constantly doing all the work.
22. The grasshopper was very lazy and the ant was continuously doing all the work.
23. The grasshopper was very lazy and the ant was constantly doing all the work.

By the 15th copy, the recipient produced a perfect word-for-word match with the original, although an error crept in during the 21st copy, with the phrase "hard working" reappearing. "Hard working" was part of the initial rendition of this sentence in the first through eighth copies. Similarly, the word *continuously*—rather than *constantly*—occurs in the

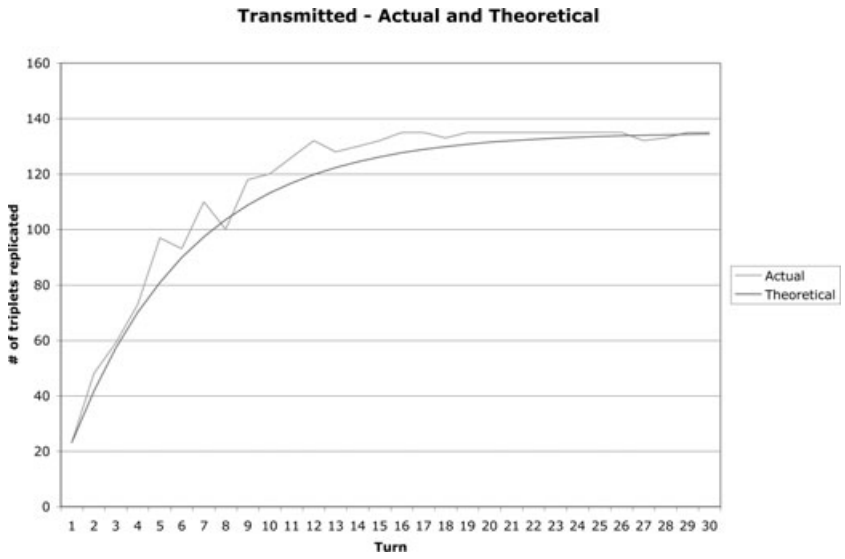

FIGURE 2. *Data from one instance of the Basic Transmission Experiment, together with the theoretically predicted values (R = 16.6 percent).*

22nd copy, apparently harking back to copies 9, 10, and 11, where it occurs prior to the acquisition of the word *constantly*.

The tendency of earlier inaccurate copies to be perpetuated is a significant aspect of this experiment. This is not something I had anticipated in my original deductive reasoning, although obviously it made sense. It is as if the copy produced by the individual competes against the original for the individual's attention. Because the individual interacts with the copy nearly as much as with the original, it is obvious that the copy must be regarded as itself a part of the transmission process.

If the copy produced by the replicator competes against the original for the replicator's attention, it occurred to me that it might be possible to measure the competition in this experiment. Competitive force—that is, in this case, the force of the artifact created by the replicator—can be measured as follows: look for triplets that match the replicator's prior words but that do not match the triplets in the original. The number of matching triplets will provide an indication of the force of the competition relative to the metacultural force impelling replication of the original.

In the above example, competition is manifested in the word *but,* which appears in the second turn. That word is not part of the original narrative. Nevertheless, it gets replicated in turns 3–7, before the word *and* from the original finally appears. Replication of the competing word inhibits the transmission (or taking up) of the word from the original. Hence, it inhibits motion from the original to the replica.

Competitive replication—interfering with the verbatim repetition of the original, and perhaps coming to appear to the replicator as if it were a verbatim copy of the original—could be understood through the Law of Inertia: culture that is already in motion tends to stay in motion at the same rate unless it is acted on by some other force. In the case of the replica, it is as if the replicators were transmitting the culture to themselves, with the sentences they have articulated appearing to them to come from the outside when they are in the process of constructing their subsequent turn. A force is required to get them to dislodge the competing bit of culture and replace it with something more closely approximating the original. The force, in this case, is the reflective force of the metacultural instruction that the replicators received: "repeat the story exactly, in word for word terms, as you heard it."

In this sentence, and, actually, in the entire story, the metacultural force eventually facilitates the acquisition of a significant portion of the wording contained in the tape-recorded original, thereby overcoming the competition. However, in this instance competition never fully disappears. The replicator reported his belief that he had achieved word-for-word replication of the original, although he had not. This effect, detected experimentally, may be related to the phenomena pointed out by Benjamin Lee Whorf (1956) and often gathered together with other phenomena under the label "Sapir-Whorf Hypothesis" (Lucy 1992a, 1992b).

Judging from follow-up comments, participants would not have spontaneously chosen to listen to this tape recording (at least, not repeatedly), nor endeavored to replicate it, at least not in word-for-word fashion. This provides evidence that the passage of culture here is brought about by metacultural force. The force driving competition is interest. In this instance, it is interest on the part of the research participants in their own wordings of the narrative as opposed to those contained in the original.

I came to think of competition as affecting the total number of triplets available for transmission (N in the earlier equation). The competing words in effect remove some triplets from accessibility for transmission. In the example above, the *but* that is replicated in lines 2–8 effectively

removes the *and* in the original from the number of words (or word triplets) available for transmission.

So far I have proposed the operation of several forces: inertia, metaculture, and interest. What appears to be an additional force—namely, entropy—turned up in this experiment as forgetting once a cultural element has been acquired. In the sample sentence above, numerous instances appear of failure to replicate the original even though the replication had taken place in a prior turn. In some of these, failure can be traced to the reemergence of competing forms from earlier turns. For example, in Turn 22, the word *continuously* appears instead of *constantly,* which had been correctly used in each of the ten preceding turns. *Continuously* had been used earlier—on Turns 9–11—so that the forgetting may be because of prior competitive learning. In other cases, competition is not obviously responsible. For example, in Turns 10 and 11, the individual substitutes *while* in place of the correct *and* found in the preceding three turns. There is no earlier instance of *while* interfering in this case.

Initially, forgetting occurs at a significant rate, between four and 16 triplets in Turns 2–8—this at a time in the process when accurate replication of triplets ranged between 48 and 110. In other words, about 10.5 percent of the triplets acquired were forgotten.

If cultural transmission is proportional to interaction time (Law of Transmission), forgetting ought to diminish with the number of interactions the individual has with the original. In the last ten turns, in fact, the rate of forgetting drops to less than a half of a percent of the triplets acquired. However, it never completely disappeared. More work is needed to determine how the forgetting of acquired wording takes place over longer time intervals.

Forgetting can be distinguished, in the experimental data, from creativity, another factor affecting transmission that turned up in the course of this study. Forgetting undoes the effect of a previous transmission and, as has been shown, may be because of the reemergence of prior patterns with which the transmission is in competition. In creativity, word triplets are constructed that differ from those found in the original but that represent attempts to create a story that captures the sense of the original.

In the data, I tried to measure creativity by taking the number of triplets in the copy produced by the individual in a given turn and subtracting from it the number of triplets that match those in the original plus the number that results from competitive replication. In Turn 2, for example, the individual produced a story consisting of 123 triplets. Of these, 48 replicate triplets found in the original and eight replicate triplets from Turn 1. Hence, 56 of the triplets in this turn represent the transmission over time of other triplets, either those found in the original or those already produced by the individual. However, the remaining 67 triplets represent the individual's creative effort at producing a new piece of culture that carries over the essence of the older piece.

The data reveal a decline over time in creativity as word-for-word replication increases. By the final turns, creativity has all but vanished. Virtually all triplets derive from the original, with a handful coming from competition. The curve produced by these data is more or less the inverse of the curve for transmission. In other words, transmission operates to gradually diminish the action of creativity. Correspondingly, creativity is inversely related to transmission.

Figure 3 graphs the predicted and observed results for a single iteration of the experiment.

Eleven college students participated in the experiment, although one could not complete it because of his aversion to the task. Of the remaining ten, the graphs conformed reasonably well to the theoretical expectations. Some additional curves are shown in Figures 4 through 7. Each curve

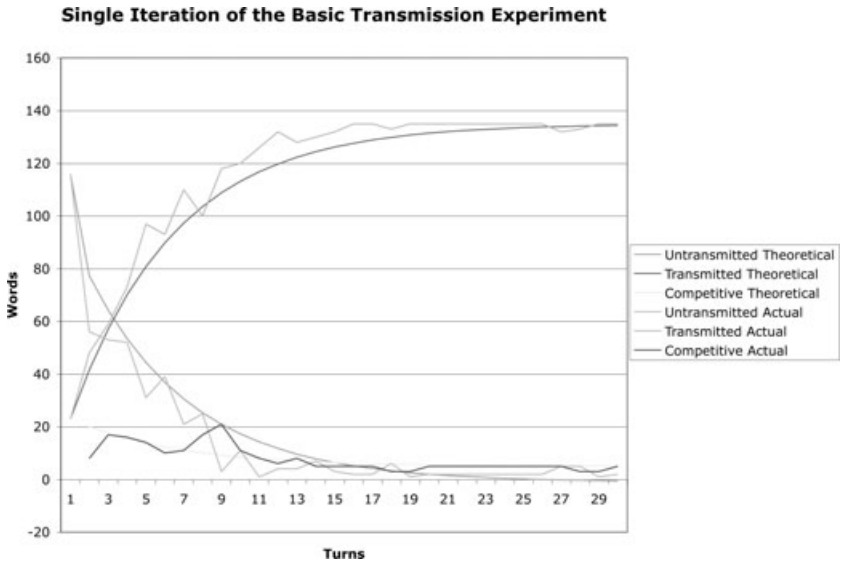

FIGURE 3. *Composite representation of a single iteration of the experiment, with theoretically predicted and actual values.*

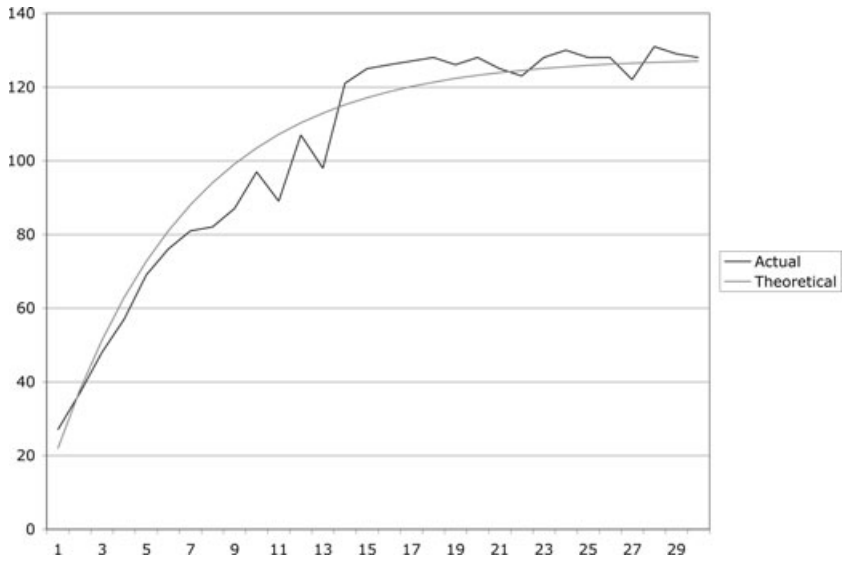

FIGURE 4. *Transmission Experiment 2.*

exhibited a different rate (R in the above equation). Lower R values produce flatter curves. In my sample, R values ranged from 0.07 (or 7 percent) to 0.25 (25 percent).

The basic equation proposed above was: $T_{t=n} = T_{t=n-1} + (N - T_{t=n-1}) \times R$. However, I discovered that at least one additional factor was at work. In all subsequent turns, unlike the first one, replicators run the risk of forgetting what has already been acquired. Because the story is listened to in its entirety each time, forgetting plays a role, and the overall R takes this into account. However, for the initial replication, there is no prior turn in relationship to which acquired words could be forgotten. Therefore, the initial value should in general be higher than this formula suggests. In fact, this was true in eight of the ten cases. In those cases, therefore, I adjusted initial R values. Adjustments ranged from 0 to 0.22 (22 percent), with the average being 0.078 (7.8 percent).

Because of the Whorfian phenomenon discussed earlier—the renarrator's own words compete with the externally heard words—transmission never reached the maximum possible. Consequently, I modified the above equation by putting in a maximal value M in place of N, where N was the total number of triplets in the original that could be transmitted. In my equations, I used percentages, so that M values were actually M divided by N expressed as a percentage. In the ten cases studied, values ranged from 72 percent (i.e., 28 percent of the triplets remained unacquired) to 100 percent (that is, no triplets remained unacquired), although in the last case the acquisition rate was so low that the maximum number of triplets was not reached. The average

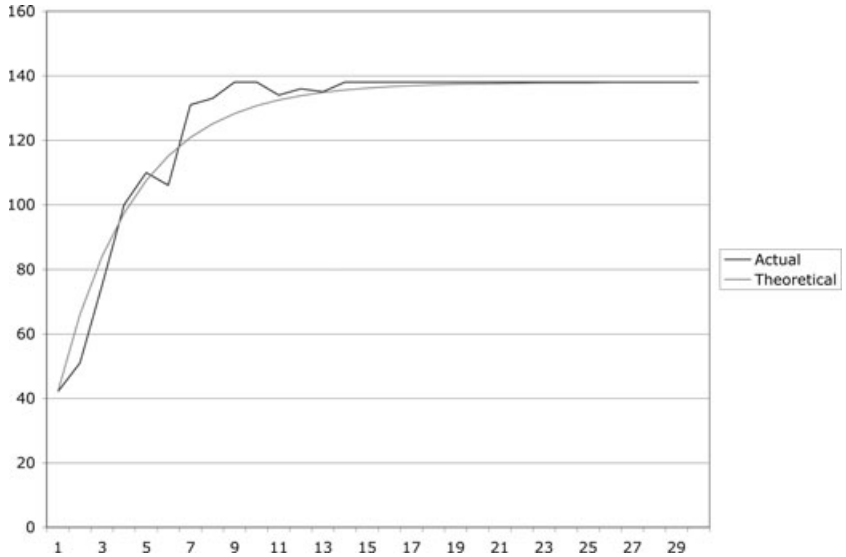

FIGURE 5. *Transmission Experiment 3.*

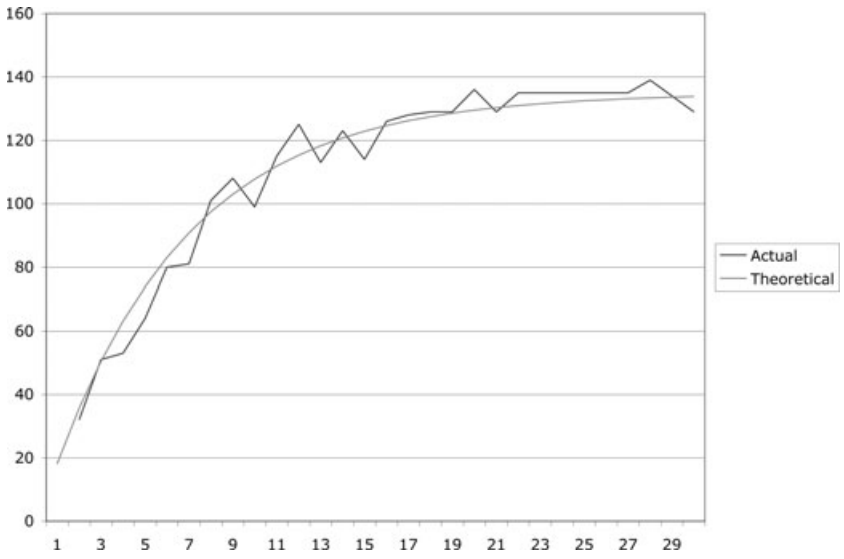

FIGURE 6. *Transmission Experiment 4.*

value was 90.28 percent, meaning that almost ten percent of triplets failed to be acquired over the course of 30 attempts at replication.

To determine how accurately theoretical curves matched empirical results, I calculated deviations between each empirical data point and its theoretical counterpart. The average deviation for ten experiments consisting of 30 data points each is 7.32 percent.

It is worth remarking that the experiment produced a group, of sorts, with a partially shared culture—fleeting though this "group" was. We had in common, in greater or lesser measure, the capability of producing similar text artifacts of a given "story." However, although I have not studied the matter, I am confident that the "shared culture" of this transitory "group" has now dissipated, owing to entropic forgetting, as well as that the nascent group has vanished with little trace.

SONGS ON THE POP CHARTS

The rise and fall of songs on the pop charts, I had long conjectured, might offer insight into the effects of interest,

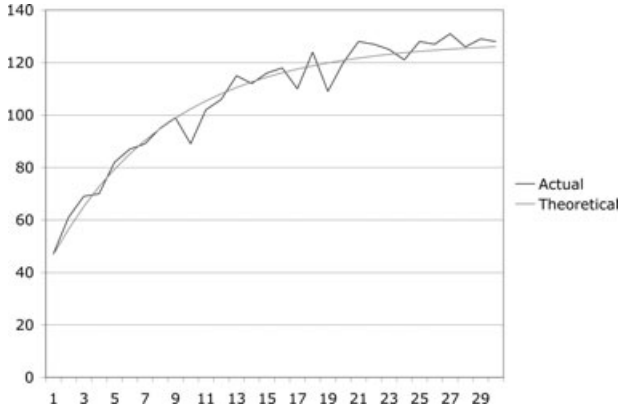

FIGURE 7. *Transmission Experiment 5.*

as a motion-producing force, on these small bits of culture. I imagined the study of pop charts as analogous, albeit in complex ways, to Kroeber's research on ceramic styles and skirt widths.[4] Having formulated some ideas about what I thought of as "laws of motion," I embarked on a study of radio airplay in the United States as measured electronically and reported weekly in *R&R—Radios and Records* and its predecessors, *Billboard Radio Monitor* and *Airplay Monitor*. The data used in this part of the article are from the years 2001–06.

Airplay is measured in what are called "spins" per week. A spin is one play of a given song on a given radio station. In 2008, the number of stations monitored was 58. A song on the Top 40 charts received anywhere from less than 1,000 spins in a week to some 10,000. On a given radio station, therefore, a charted song may be played anywhere from twice per day to more than once per hour over a 24-hour day.

My initial idea was that the audience for radio songs would behave more or less like a single individual. Below I offer reasons to question this idea. In particular, songs may hit different parts of the country or different market segments at different times. However, the idea, as I hope to show, has some utility in making sense of the available data. It is also possible to modify the analysis to take into account differences within the larger field of radio airplay in the United States.

My initial deductive reasoning was as follows: according to the Law of Force, displacement in the rate of interaction with the artifacts of a given cultural element ought to be proportional to the force applied. This proposition is what allowed me to establish a measure of the force of interest in the pop song case. The force must be equal to, or so I reasoned, the rate of change of frequency of interaction with the mass-mediated song as cultural artifact or artifact type. If frequency were increasing, the force acting on the culture

as embodied in the artifacts would be positive. If frequency were decreasing, the force would be negative.

In Top 40 songs, I surmised, force operates on the prior frequency of interaction measured as spins per week. The units of force are spins per week per week.[5] In the way I worked with the airtime data, forces are expressed as multipliers or percentages of prior interaction frequencies. So, for example, if in the first week (I call it $t = 1$), a song had been played 1,000 times—at a rate of 1,000 spins per week—and the force is a positive 50 percent (or multiplier of 0.50) of spins per week per week, then the rate of interaction in week $t = 2$ would be the prior rate (1,000 spins per week) plus the prior rate times the force ($1{,}000 \times 0.5 = 500$), so that the new rate for the current week would be $1{,}000 + 500 = 1{,}500$ spins per week.

Beginning with this deductive reasoning, my research question became: How could I determine the force (F_t) operative on a given song at a given time? In Top 40 songs, there is competition from the new songs that are constantly produced. There is also the possibility that interest in a given song will wax and wane quite apart from competition—a force suggested by ethnography with teenage radio listeners, one of whom remarked: "when you overplay a good song, it gets bad" (interview, September 15, 2008).

From this perspective, F_t seemed to be a composite force. It consisted of whatever force would be at work on the song were there no competition plus the effect of the competition. I refer to the former—the force theoretically at work in the absence of competition—as the zero competition force (or zero force), and I write it as F_t^0. Competition is also a force I call the field force and write F_t^f. My guess is that the field force is more or less constant over the life of a specific song on the charts. I also assume that it differs for different songs, and possibly at different times in the history of the field, because it depends on what other songs are on the charts at the time and how those other songs affect the particular song. Because the field force is constant for the specific song, the t subscript can be dropped. Therefore:

$$F_t = F_t^0 - F^f$$

Regarding F_t^0—the force in the absence of competition—my hypothesis evolved as follows: attraction to songs, like attraction to similar cultural elements (e.g., stories), is the desire to acquire the culture contained in them. Where positive interest is operative, the desire to extract the "new" culture from the artifact or artifact type—in this case, the mass-mediated song—results in an increase in the rate of interaction with it. However, as the culture contained in the song is acquired, interest diminishes. Eventually, interaction either ceases or reaches a maintenance level sufficient to keep the culture from dying out altogether. My specific hypothesis may be summed up as follows:

> *The diminishing attraction hypothesis*: the force causing an increase in interaction frequency with a given song will diminish over time, with the diminution increasing at a constant rate characteristic of the song. However, the diminution is also proportional to the culture remaining to be acquired from it, and so the increase in diminution itself tapers off. If the force extends into the negative range, interaction rates eventually decline and approach zero.

Empirically, songs seem to hold differential interest for individuals, with some songs of little or no interest for some and others of great interest. However, where interest is positive, an increase in the rate of interaction with the song should occur. The individual wants to hear the song more frequently. As the song becomes familiar—gets internalized—attraction diminishes. With diminution of interest, motivation to increase the frequency of hearing the song tapers off.

With no negative force at work, the positive force would go to zero and the interaction rate would approach an upper limit. By the Law of Inertia, the interaction rate should then remain constant. Reasoning from the laws, therefore, negative forces, in addition to positive, must be at work.

One negative force operative on interaction rates would seem to be the field force: a positive interest in other songs that pulls away interest from any particular song. To make the Top 40, a song must generate sufficient interest to break through the negative force—or surface tension—produced by interest in songs other than itself. Once a song breaks through and rises on the charts, that negative force does not disappear. It continues to pull down on the rising interaction rate, somewhat the way gravity pulls down on a rising projectile.

The field force may not be the only negative force operative on a song. Another candidate is what might be dubbed the Westermarck effect: the idea popularly expressed as "familiarity breeds contempt."[6] In the case of songs, this is suggested by the teenage formulation that overplaying turns a good song bad. Because I am unable at this point to differentiate competitive field force from the Westermarck effect, I have lumped them under the field force in the equations below.

Owing to competition (the field force) as well as the Westermarck effect, the rate of increase in interaction with songs eventually enters the negative range. The result is either cessation of interaction with the song or reduction of interaction rates to maintenance (or habitual) levels. Maintenance rates may have to do with the tendency to forget—the entropic force—revealed in the experiment above, as well as with the changeover of audience as new individuals enter radio listening audience and old depart, but I currently lack data to study this phenomenon.

If $F_{t=1}$ is 0.50 or 50 percent of previous spins per week per week, and the interaction rate at $t = 1$ (symbolized as $I_{t=1}$) is 1,000 spins per week, then $I_{t=2} = 1{,}500$ spins per week. Suppose $F_{t=2}$ has diminished by 0.10 or ten percent of spins per week per week. The new force $F_{t=2}$ is then

0.50–0.10 or 0.40 (i.e., 40 percent). Even though the force has diminished, it remains positive. The interaction rate for time t = 3 then is:

$$I_{t=3} = I_{t=2} + (I_{t=2} \times F_{t=2})$$
$$= 1{,}500 + (1{,}500 \times 0.40) = 2{,}100$$

Despite the drop in force, the interaction rate has undergone an increase greater in absolute terms than in the previous week. It is only when F_t turns negative that interaction rates decline.

At this point, I wondered how I could calculate the zero force, F^0_t—that is, the force in the absence of competition and the Westermarck effect? The zero force at time t = n is just the zero force at time t = n − 1 minus the diminution at time t = n, that is:

$$F^0_{t=n} = F^0_{t=n-1} - D_{t=n}$$

Regarding diminution at time t = n, the idea summarized in the diminishing-attraction hypothesis is that diminution increases at a constant rate, which can be termed the "decay rate," D^{rate} or D^r, but also that the diminution occurs in proportion to the culture remaining to be extracted. The decay rate will be a constant characteristic of the song and will operate over the life of the song on the Top 40 chart. It can be expressed as a fraction of the initial diminution, $D_{t=1}$. Hence:

$$0 < D^r \leq 1$$

If $D^r = 1$, then the decay rate has no influence on diminution, which will be proportional to the amount of culture remaining to be extracted.

Because the force of interest, according to the idea developed here, drives the extraction of culture, the amount of culture remaining is proportional to the zero force remaining: that is, it is proportional to the fraction $(F^0_{t=1} - D_{t=n})/F^0_{t=1}$. Consequently, the diminution at time t = n can be calculated as follows:

$$D_{t=n} = D_{t=n-1} + D_{t=n-1} \times D^r \times \left(\left(F^0_{t=1} - D_{t=n-1}\right)/F^0_t\right)$$

One idea I had about Top 40 songs—and other culture, like stories, subject to entropic decay—has not yet been captured. This is the notion that, if a song is sufficiently interesting, it will reach a long-term or habitual frequency level. At this point, I lack empirical data to shed light on the characteristics of this habitual level. Consequently, I simply added a habitual interaction frequency to the formula for calculating the interaction rate over time—inadequate, but there it is. I label the habitual rate H.

The trajectory of Top 40 songs—based on reasoning from the laws of motion and on ideas about songs as culture—could be described by the following equations, where each subsequent equation expands the preceding one:

$$I_{t=n} = I_{t=n-1} + (I_{t=n-1} \times F_{t=n}) + H$$

[Change in rate of interaction is proportional to the force of interest]

$$F_t = F^0_t - F^f$$

[The force of interest is the force in the absence of competition (zero force) minus the force of competition from other culture (field force)]

$$F^0_{t=n} = F^0_{t=1} - D_{t=n}$$

[The force in the absence of competition diminishes over time]

$$D_{t=n} = D_{t=n-1} + D_{t=n-1} \times \quad D^r \times \left(\left(F^0_{t=1} - D_{t=n-1}\right)/F^0_t\right)$$

[The diminution in force increases over time at a rate (decay rate) characteristic of the cultural element and also proportionally to the amount of culture remaining to be acquired]

Figure 8 charts the interaction time over time for a specific song: "Hit 'Em Up Style," by Blu Cantrell. The chart is based on *Airplay Monitor*'s reporting of spins per week over a 52-week period beginning the week of July 6, 2001. A single spin is one complete playing of the song on a given radio station. Because *Airplay Monitor* electronically tracks spins from radio stations across the United States, a top song will achieve thousands of spins per week. The curve for each song I have investigated is unique, suggesting a specific constellation of forces at work on the interaction time with it.

I concede, even as I write, that the equations look ridiculously complicated. In reality, though, the formulas can be readily set up in a spreadsheet. I took the initial interaction rate ($I_{t=1}$) from the actual data. For Blu Cantrell's song, the rate in the first week was 781 spins per week. In my spreadsheet, I converted this to a percentage of total spins in the field, which I set at 240,000. This is not a necessary step, but I found it convenient to think in terms of percentages and then to convert the percentages into actual spins. So 781 spins per week is 781 ÷ 240,000 or approximately 0.33 percent of the total spins per week in the field.[7]

The values of $F^0_{t=1}$, $D_{t=1}$, F^f, and H were arrived at by observing their behavior relative to actually recorded curves. The initial zero force is the initial force of interest driving the rise in interaction rate. The initial diminution is the corresponding initial rate of drop off in interest. The decay rate measures the "staying power" of a song: its tendency to succumb to (or resist) the diminution in interest over time. H is the longer-term or habitual rate of interaction the song is able to sustain. I stress that I cannot yet measure these values independently of the empirical curve at the present time, although I hope that it will prove possible to do so in the future.

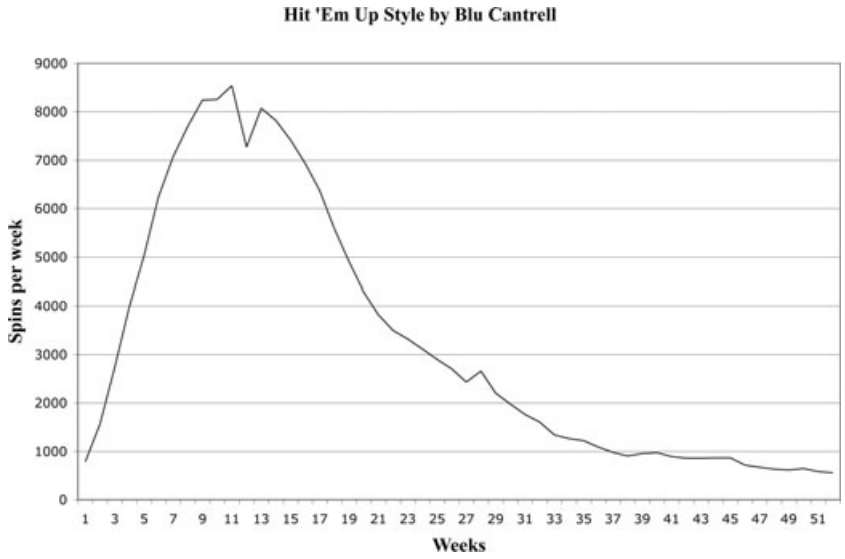

FIGURE 8. *Actual spins per week over a 52-week period for one pop song.*

Figure 9 shows the curve produced by using the following values:

$F^{0}_{t=1}$ = 38 times spins per week per week
$D_{t=1}$ = 39.17 times spins per week per week
F^{r} = 0.12 times spins per week per week
H = 72 spins per week or 0.03 percent of spins per week in the field

I have so far investigated 49 Top 40 songs. Of these, 48 have empirical curves corresponding reasonably well—like "Hit 'Em Up Style"—to theoretically calculated curves. One—"Lonely No More" by Rob Thomas—exhibits two separate peaks with a valley in between (see Figure 10). An analysis of the song as consisting of two unequal waves produces a close approximation to the empirical curve. One other song also yields a better analysis with the model of two separate waves summed together. It is possible that the analyses of other songs can be improved by viewing the field of U.S. radio airplay as differentiated, in contrast to my assumption that it behaves like a single individual. Figures 10 through 17 give some indication of the range of shapes encountered and of the fit of curves generated by the equations.

LANGUAGES IN CONTACT

While studying song curves, I began to wonder about longer-term forces affecting cultural motion, ones occurring over centuries rather than weeks. It occurred to me to search for evidence in the usage by English speakers of words from French beginning with the Norman Conquest. My reasoning was as follows: if speakers of language A, say English, incorporate words from language B, say French, into their lexicon, then they are increasing their frequencies of interaction with the new words. Because words are artifact types, some of the culture carried in B (by the Law of Transmission) should

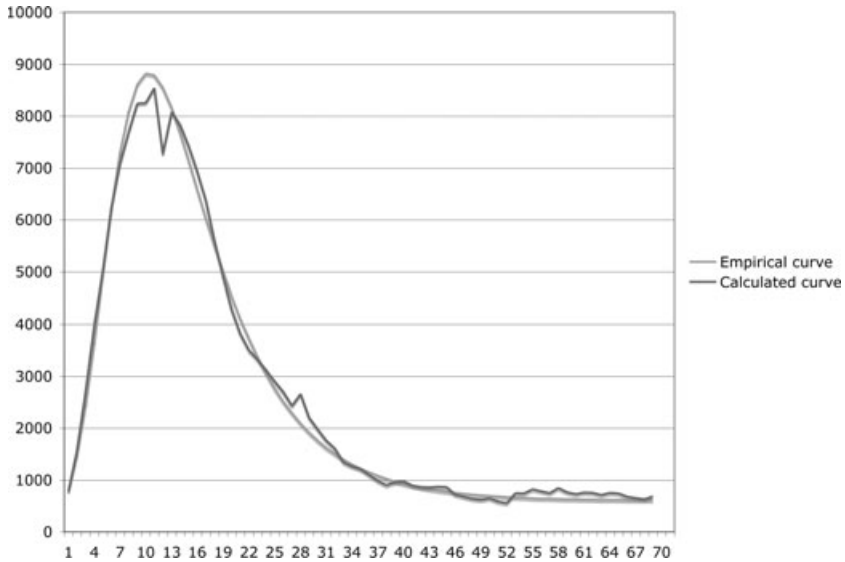

FIGURE 9. *Calculated and empirical spins per week for one pop song.*

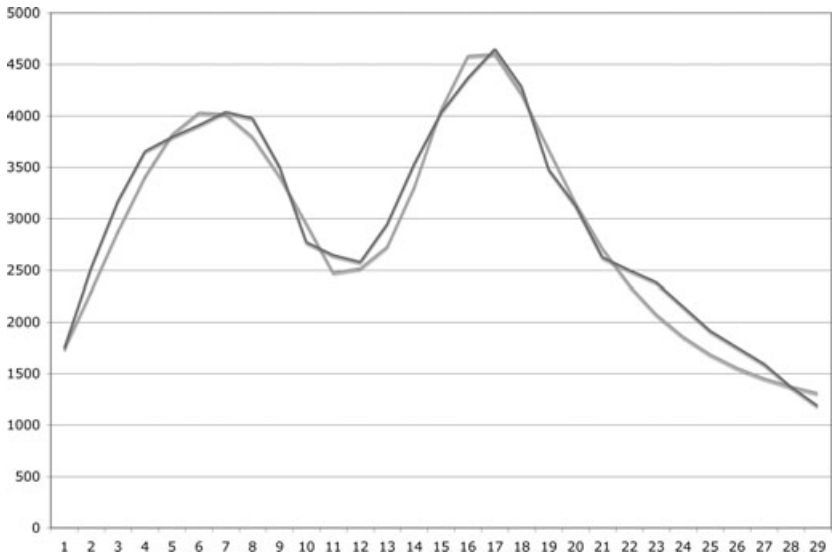

FIGURE 10. *Lonely No More (Rob Thomas).*

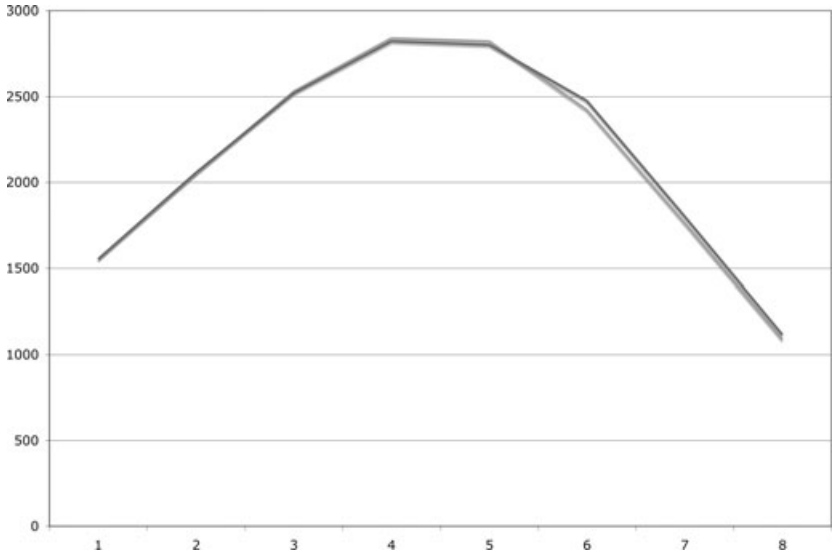

FIGURE 11. *Only U (Ashanti).*

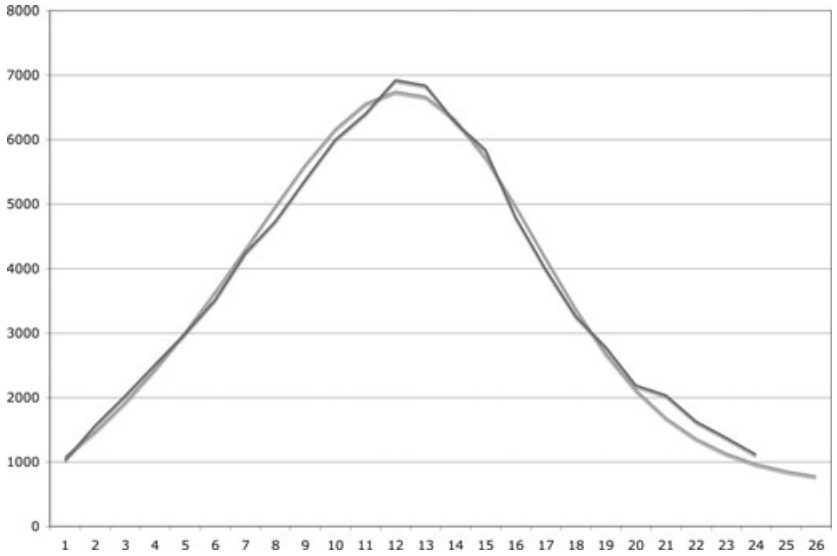

FIGURE 12. *You're Beautiful (James Blunt).*

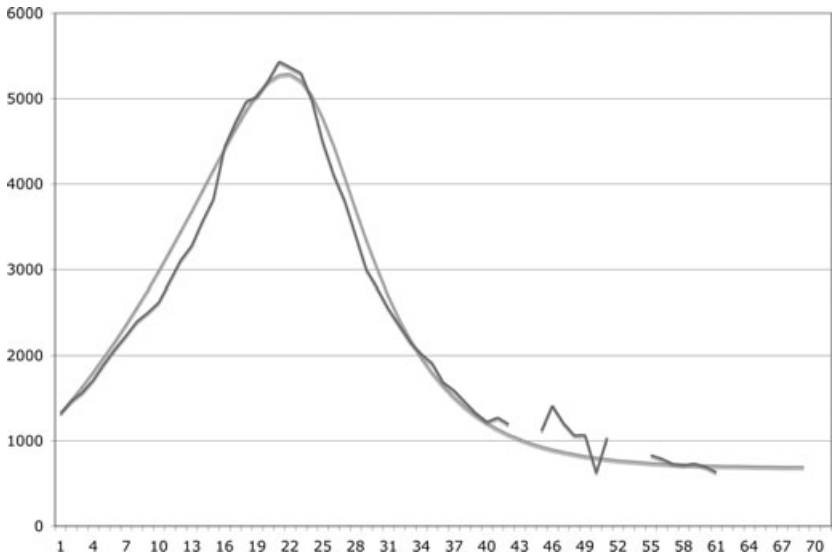

FIGURE 13. *Meant to Live (Switchfoot).*

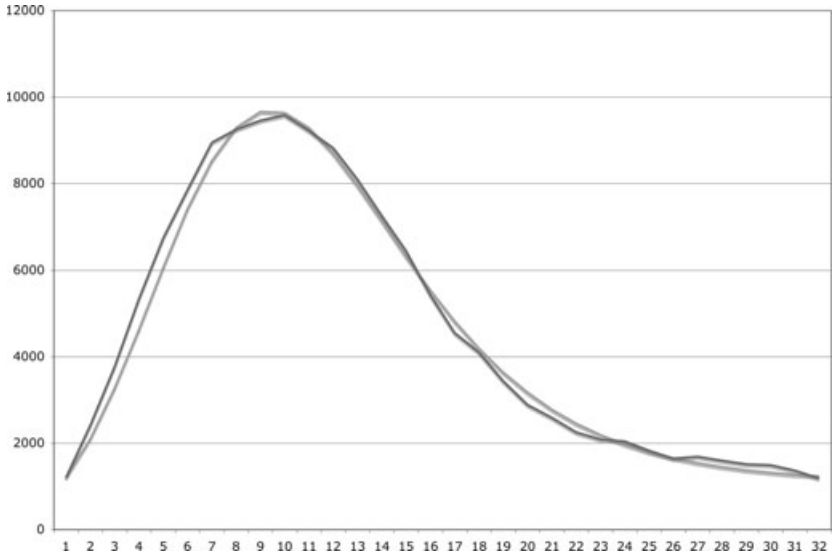

FIGURE 14. *Hollaback Girl (Gwen Stefani).*

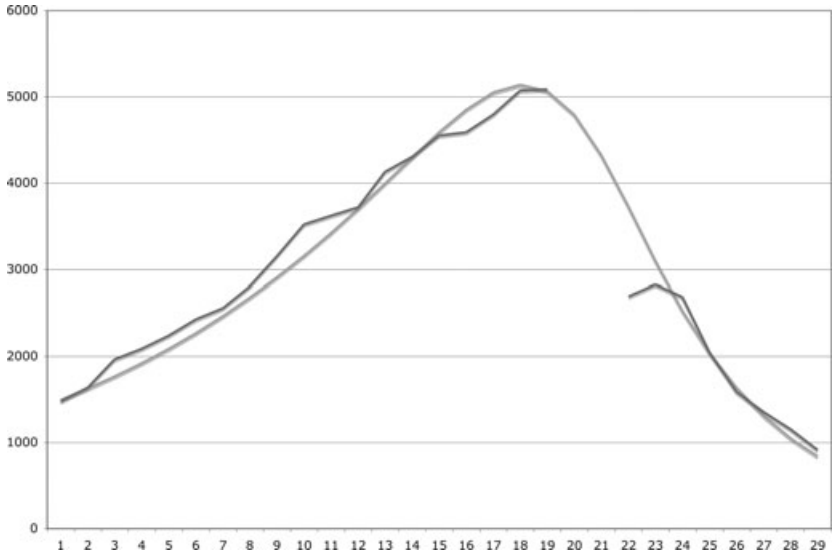

FIGURE 15. *More to Life (Stacie Orrico).*

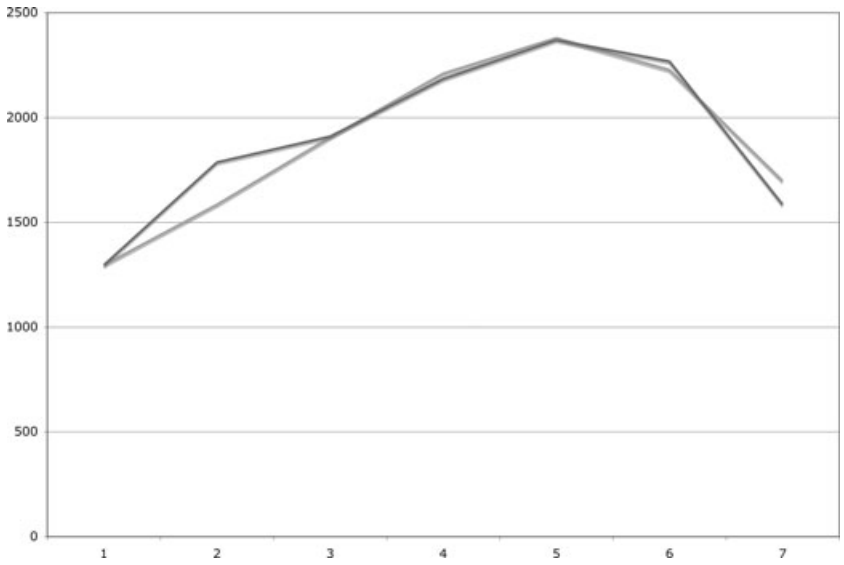

FIGURE 16. *All Falls Down (Kanye West).*

be taken up by the speakers of A and incorporated into A, thereby reshaping Language A as complex cultural element.

For such a flow to occur, the inertial motion of culture must get disrupted. Because, by the Law of Force, displacement in the rate of interaction is proportional to the force applied, some force must be driving the movement of B words into language A. My hunch was that the operative force might be that of interest, produced by the prestige of the new words, and consequently that the force may show similarities to that operative in Top 40 songs, only unfolding over a much longer stretch of time—fadlike interest, so to speak, that spans generations.[8]

The specific idea I developed was that the force could be measured by the rate of incorporation of new words from B by speakers of A. Acquisition of a new word requires interaction time with the word tokens or artifacts. Consequently, the cumulative number of words incorporated ought to reflect the cumulative interaction time of English speakers (speaking English) with the French lexicon.

To study this question, I examined, with the help of research assistants, 21,272 word etymologies from an etymological dictionary.[9] I recorded the language of origin of each word and the date of its first appearance in a written text in English. The usual caveats concerning reliability of dates render the data less precise than optimal, but I hoped that aggregate patterns would emerge from the vagaries of historical texts relative to spoken usage.

Figure 18 below shows the theoretically calculated curve, using the equations for Top 40 songs, superimposed on the empirically derived curve. I conducted analogous studies of all French words borrowed into English, and also Latin words, with similar results. S-shaped curves like the ones I describe here are prevalent in sociolinguistic research and also in studies of diffusion more

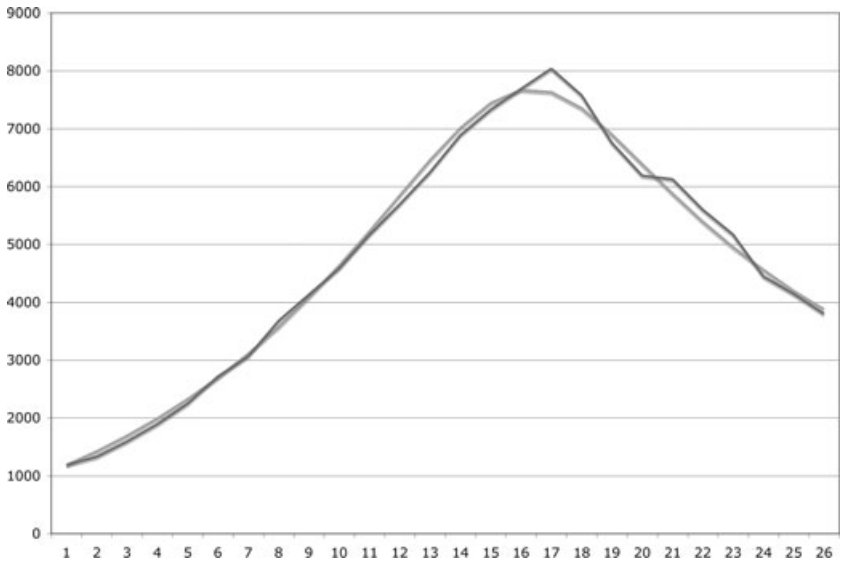

FIGURE 17. *When I'm Gone (Eminem).*

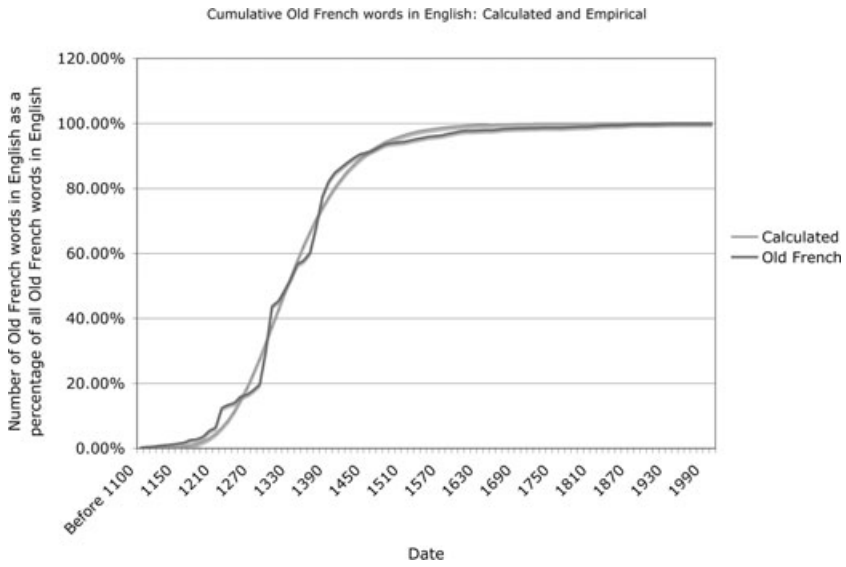

FIGURE 18. *Calculated versus empirical values of cumulative Old French words in English by decade.*

generally. Joseph Henrich, in fact, remarks that "one of the most robust findings from over 3,000 studies in the innovation of diffusion literature is the S-shaped cumulative adoption curve" (2001:993). Looking at interest as a force affecting the trajectory of diffusion may prove one way to conceptualize such findings, a way alternative to the more established approach using probability density curves from statistics to model the results.

CONCLUSION

Tylor's definition of *culture* ended with "capabilities and habits," but it began with a sweeping overview: "that complex whole which includes knowledge, belief, art, morals, law, custom" (1889:1). My sights in this article have been set on the particulate bases of motion: artifacts and artifact types and the similarities and differences between them as evidence of cultural motion. It is to this level that I view the laws and method proposed here as relevant. This befits research growing out of the fine-grained study of discourse in Amerindian communities and out of the traditions of linguistic anthropology, folklore, and ethnomusicology.

At the same time, my hope is that the ideas may not be wholly irrelevant to broader concerns in cultural anthropology today. Events, for example, as viewed by Sahlins (1985) in relation to "structure," can be conceptualized as complex artifacts, conjunctures of trajectories of smaller bits of culture, such as those investigated here. Correspondingly, some cultural phenomena in which anthropologists are currently interested—for example, biological citizenship (Petryna 2002), blackness (Jackson 2005), or gay and lesbi subjectivities (Boellstorff 2003)—are not realized in any single artifact type, except perhaps the words through which they are named. Rather, they become publicly accessible through relationships obtaining among a myriad of artifact types held together in characterizable or at least recognizable aggregates.

The danger of focusing on the minutiae through which such complex cultural aggregates are manifested is that one loses sight of the whole, fails to comprehend their existence as things in their own right. My proposal is not that researchers abandon such ethnographic projects. It is, rather, that some good may come from studying these complex entities as entities, as well as in terms of the smaller bits of which they are composed. Furthermore, the aggregates may turn out to exhibit motional patterns similar to those of bits, if we knew how to measure their motion. After all, a lexicon, such as that of English, is made up of thousands of small artifact types and, hence, is itself a complex artifact type, undergoing change as it incorporates words from other languages, based on exposure to them.

If the aggregates are "cultural," then they must, at least in Tylor's understanding of the term, be acquirable socially: that is, socially learnable and socially transmittable, in the terminology I have been using. It makes sense to consider the interaction time with them (or exposure time to them) as resulting in their social acquisition and, hence, their motion through the world. It makes sense to think of them in terms of inertia: as continuing to be transmitted at the same rate unless they are acted on by some additional force. And, finally, it makes sense to conceptualize their motion through space and transformation over time at the behest of other forces as proportional to the magnitude of those forces.

Greg Urban *Department of Anthropology, University of Pennsylvania, Philadelphia, PA 19104; gurban@sas.upenn.edu*

NOTES

Acknowledgments. Although its core insights concerning laws and the proportionality of transmission to interaction time date to my graduate student days in the mid-1970s, this article would never

have assumed its present form without the contributions of many extraordinary people, including the anonymous reviewers and *AA* Editor, Tom Boellstorff, who together produced an astounding quantity of valuable commentary in response to earlier drafts—by no means always positive, I should add. I thank also participants in the Cultural Motion seminar at the University of Pennsylvania as well as those in the Penn Anthropology colloquium series, in which an initial draft of this article was presented. My research assistants for the various projects discussed here deserve special commendation: Israel Durham, Caleb Green, Katie Hawkes, Kyung-Nan Koh, Elana Marion, Lisa Patterson, Serena Stein, and Corinne Wesh. Lastly, Susan Lepselter and Steve Feld were the only individuals, to my knowledge, to have read and commented on the hermetically sealed and ridiculously long initial draft. Thanks to all of you!

1. The "original" was a version of Aesop's fable, "The Ant and the Grasshopper," by humorist Dave Barry (1991:107).
2. After multiple listenings by my research team, there continued to be disagreement over whether 140 or 141 words were actually distinguishable.
3. Ten is too small for definitive conclusions, and I hope to ramp up this study in the future. However, the research is labor intensive.
4. Bradlow and Fader (2001) developed a probabilistic model for the rankings of songs on the "Hot 100" *Billboard* lists for 1993, using generalized gamma distribution curves, but I have otherwise been unable to find a literature dealing with the kinds of data used in this section.
5. This indicates a measure of acceleration. So the rate in a given week is x spins per week. But if that rate is changing at a certain rate each week, then the measure will be change in the number of spins per week each week, or spins per week per week. The analogy is to the well-known usage in physics to describe acceleration: 32 feet per second per second—that is, the force exerted by gravity.
6. Edvard Westermarck developed the hypothesis to explain the tendency toward avoidance of incest between siblings and between parents and children (Westermarck 1891).
7. The actual number of spins in the field is not important for the calculations, because the percentages can be adjusted.
8. This is not necessarily the case. The force might also be metacultural, for example, laws enacted requiring the use of certain words or prohibiting the use of others.
9. For convenience, I used Douglas Harper's *Online Etymology Dictionary* (2001).

REFERENCES CITED

Agha, Asif
2007 Language and Social Relations. Cambridge: Cambridge University Press.

Appadurai, Arjun
1996 Modernity at Large: Cultural Dimensions of Globalization. Minneapolis: University of Minnesota Press.

Barry, Dave
1991 Dave Barry Turns 40. New York: Random House.

Benedict, Ruth
2005[1934] Patterns of Culture. Boston: Houghton Mifflin.

Boellstorff, Tom
2003 Dubbing Culture: Indonesian *Gay* and *Lesbi* Subjectivities and Ethnography in an Already Globalized World. American Ethnologist 30(2):225–242.

Bohannan, Laura
1966 Shakespeare in the Bush. Natural History 75(7):28–33.

Bradlow, Eric T., and Peter S. Fader
2001 A Bayesian Lifetime Model for "Hot 100" *Billboard* Songs. Journal of the American Statistical Association 96(454):368–381.

Geertz, Clifford
1973 The Interpretation of Cultures. New York: Basic.

Graebner, Fritz
1911 Methode der Ethnologie. Heidelberg: C. Winter.

Harper, Douglas
2001 Online Etymology Dictionary. http://www.etymonline.com/, accessed July 2, 2008.

Henrich, Joseph
2001 Cultural Transmission and the Diffusion of Innovations: Adoption Dynamics Indicate That Biased Cultural Transmission Is the Predominate Force in Behavioral Change. American Anthropologist 103(4):992–1013.

Jackson, John
2005 Real Black: Adventures in Racial Sincerity. Chicago: University of Chicago Press.

Keane, Webb
1997 Signs of Recognition: Powers and Hazards of Representation in an Indonesian Society. Berkeley: University of California Press.
2003 Semiotics and the Social Analysis of Material Things. Language and Communication 23:409–425.

Kroeber, Alfred L.
1916 Zuñi Potsherds. American Museum of Natural History, Anthropological Papers 18:1–37.
1919 On the Principle of Order in Civilization as Exemplified by Changes of Fashion. American Anthropologist 21:235–263.

Kroeber, Alfred L., and Clyde Kluckhohn
1952 Culture: A Critical Review of Concepts and Definitions. New York: Meridian.

Labov, William
2007 Transmission and Diffusion. Language 83(2):344–387.

Lucy, John
1992a Language Diversity and Thought: A Reformulation of the Linguistic Relativity Hypothesis. Cambridge: Cambridge University Press.
1992b Grammatical Categories and Cognition: A Case Study of the Linguistic Relativity Hypothesis. Cambridge: Cambridge University Press.

Maurer, Bill
2000 A Fish Story: Rethinking Globalization on Virgin Gorda, British Virgin Islands. American Ethnologist 27(3):670–701.

Petryna, Adriana
2002 Life Exposed: Biological Citizenship after Chernobyl. Princeton: Princeton University Press.

Richardson, J., and A. L. Kroeber
1940 Three Centuries of Women's Dress Fashions: A Quantitative Analysis. Anthropological Records 5(2):111–153.

Sahlins, Marshall
1978 Culture and Practical Reason. Chicago: University of Chicago Press.
1985 Islands of History. Chicago: University of Chicago Press.
Schmidt, Johannes
1871 Zur Geschichte des indogermanischen Vocalismus [On the history of Indo-European vowels], part 1. Weimar: H. Böhlau.
Silverstein, Michael
2005 Axes of Evals. Journal of Linguistic Anthropology 15(1):6–22.
Tylor, Edward B.
1889[1871] Primitive Culture: Researches into the Development of Mythology, Philosophy, Religion, Language, Art, and Custom, vol. 1. 2nd edition. New York: Henry Holt.
Urban, Greg
1991 A Discourse-Centered Approach to Culture: Native South American Myths and Rituals. Austin: University of Texas Press.
2001 Metaculture: How Culture Moves through the World. Minneapolis: University of Minnesota Press.
Westermarck, Edvard
1891 The History of Human Marriage. New York: Macmillan.
Whorf, Benjamin Lee
1956 The Relation of Habitual Thought and Behavior to Language. *In* Language, Thought, and Reality: Selected Writings of Benjamin Lee Whorf. J. B. Carroll, ed. Pp. 134–159. Cambridge, MA: MIT Press.
Wissler, Clark
1927 The Culture-Area Concept in Social Anthropology. American Journal of Sociology 32(6):881–891.

FOR FURTHER READING

(These selections were made by the American Anthropologist *editorial interns as examples of research related in some way to this article. They do not necessarily reflect the views of the author.)*

Bashkow, Ira
2004 A Neo-Boasian Conception of Cultural Boundaries. American Anthropologist 106(3):443–458.
Bunzl, Matti
2008 The Quest for Anthropological Relevance: Borgesian Maps and Epistemological Pitfalls. American Anthropologist 110(1):53–60.
Duany, Jorge
2000 Nation on the Move: The Construction of Cultural Identities in Puerto Rico and the Diaspora. American Ethnologist 27(1):5–30.
Durrenberger, E. Paul, and Dimitra Doukas
2008 Gospel of Wealth, Gospel of Work: Counterhegemony in the U.S. Working Class. American Anthropologist 110(2):214–224.
Fuller, Janet M.
2007 Language Choice as a Means of Shaping Identity. Journal of Linguistic Anthropology 17(1):105–129.
Lin, Jan
1997 Gateways in the Flow of Capital and Culture: Hong Kong and New York as World Cities. City and Society 9(1):217–240.
Myers, Fred
2004 Ontologies of the Image and Economies of Exchange. American Ethnologist 31(1):5–20.