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Complex Systems in the History of American English

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I would like to propose an answer to the general question of how new varieties of a language emerge, and what then happens to them over time. My example is American English, and I have discussed two competing models for the formation of American English (2002: 237), the traditional metaphors of the melting pot and the mixing bowl, concluding that

the best solution to explain the historical and social as well as the linguistic facts is that the American colonies represented a melting pot of linguistic features overall, out of which different localities eventually created a new mixing bowl of regional voices. We see that linguistic features were retained from the habits of individual speakers, but not whole linguistic systems from constituent immigrant languages or dialects. The default condition for English in the colonies in the seventeenth century was not "London standard" (whatever that could have meant given the great population mobility of the time), but instead a pool of linguistic features collected from a radically mixed settlement population.

What I could not describe at the time was the process by which particular linguistic features came to prevail in the English of the colonies, and by which different features could become more common in different areas. Since then, I have written extensively about the fact that language in use, speech as opposed to linguistic systems as usually described by linguists, satisfies the conditions for complex systems as defined in sciences such as physics, evolutionary biology, and economics (most thoroughly in Kretschmar 2009). This essay discusses implications for the initial formation of American English and its varieties as the product of random interactions in a complex system between speakers of different input varieties of British English. The findings of this approach contrast sharply with more traditional accounts, but they are not in conflict with Edgar

Schneider's recent book *Postcolonial English* (2007). In addition, the essay will address the related questions of how a variety can be extended over new areas, and how a variety can continue to change within its area. We cannot answer the question "why" American English is as it is--there is never a good answer to the "why" question in linguistics--but it is now possible to address more adequately the question "how" it came to be as it is.

Let us begin with the facts of immigration and settlement. North American settlement by English speakers began in the seventeenth century, amounting at that time to about 150,000 migrants from all parts of Britain (Bailyn 1986). Two characteristics of European settlement – introduction of disease and violence towards the survivors -- created a pattern of replacement of the native population, rather than integration with it, that would continue long thereafter. Up to 90% of the Eastern Native American population was lost (see Dobyns 1983, Smith 1994). The settlers themselves were not immune to disease. The earliest English settlements to survive at all after Sir Walter Raleigh's initial Roanoke colony disappeared without trace, Plymouth and Jamestown, suffered mortality rates of 50% or more in their first years, and child mortality was up to 50% before the age of twenty (Bailyn 1986: 100). So, the population of English settlers, too, was subject to rapid and continuing replacement. This created mixed populations of English speakers in every settlement from different British regions. This fact stands in contrast to more romantic views, such as historian David Fischer's book, *Albion's Seed* (1989). Fischer gives the impression that British regional culture was transplanted whole to North America, with section titles like "East Anglia to Massachusetts" and "The South of England to Virginia." He is simply wrong to write that "On Smith and Tangier islands . . . immigrants from the far southwest of Britain founded a culture which still preserves the dialect of seventeenth century Cornwall and Devon" (1989: 784). Nobody today preserves in its entirety Shakespeare's English or any other regional British variety from the seventeenth century, because no living language fails to change over time. Even

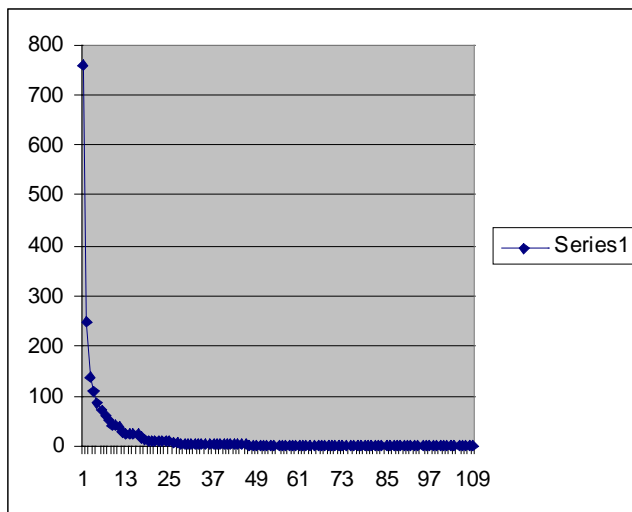
settlements like Plymouth that are often supposed to be regionally homogenous were actually quite mixed, as we know from the Mayflower passenger list and from complaints by the Pilgrims about their non-Pilgrim neighbors. Moreover, many English settlers had already migrated to London before taking ship for America. Keene reports that "Most adult Londoners were born outside the city: in the eighteenth century the outsiders may have been as many as two-thirds of the total" (Keene 2000: 109). North American emigration accounted for as much as 70% of English population increase during the seventeenth century, and a majority of those people came to North America through London (Bailyn 1986: 40). So, early immigration from London did not constitute a population of "standard" speakers, but a pre-mixed blend of regional voices.

The effect of early general replacement of the native population by English settlers, and of the continuous change in the immigrant population owing to mortality and new migrants, was to create a new "complex system" of speech interactions. Such complex systems were originally described in the physical and biological sciences, but they also occur in the social sciences, as for instance in economics. Kretzschmar (2009) demonstrates how complex systems constitute speech. This "linguistics of speech" differs from rule-based approaches to the study of language by focusing on four main points, each compatible with complex systems: "1) the continuum of linguistic behavior, 2) extensive (really massive) variation in all features at all times, 3) importance of regional/social proximity, and 4) differential frequency as a key factor in linguistic production both in regional/social groups and in collections of text corpora" (Kretzschmar 2009: 8). Complex systems are made up of massive numbers of components interacting with one another, and this results in self-organization and emergent order. For speech, the "components" are all of the possible realizations of linguistic features as they are deployed by human agents, the speakers. The order that emerges in speech is simply the fact that our use of particular words and other linguistic

features is significantly clustered in the local communities in which we actually communicate. We tend to talk like the people nearby, either physically near or socially near, or both. The same thing happens in the different texts we write and the types of conversations we have; we tend to use the same linguistic tools that others do when we are writing or saying the same kind of thing.

Complex systems exhibit two technical characteristics, non-linear distribution and scaling, and these properties are what we need to describe variety formation. When the variant types of a linguistic feature are graphed according to their token frequency (Fig. 1), the chart exhibits a non-linear asymptotic hyperbolic curve (or A-curve), characterized by a small number of highly frequent responses and a much larger number of less-frequently-occurring responses (the long tail).

Fig. 1 109 variant names for 'thunderstorm' from the eastern US (American Linguistic Atlas Project, www.lap.uga.edu)



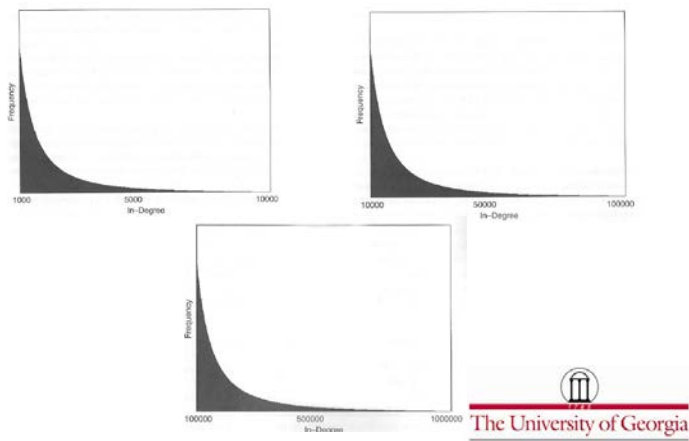
The concept of the A-curve will be familiar to those who know Zipf's Law, which states that the frequency of words in a text is inversely proportional to their rank. Jean Séguy noted the same non-linear distribution of linguistic distance as a function of geography (1971), now known as Séguy's Law. The word "law" in both cases is actually an

overstatement; the distributions in my Atlas data are always non-linear but they vary somewhat in proportions. The A-curve is a good example of the non-linear distributional pattern characteristic of complex systems.

The property of scaling is also characteristic of complex systems. ■Melanie Mitchell has illustrated this phenomenon, sometimes called a "scale-free network," from the frequency of links found on Web pages (2009: 240-243). As shown in Fig. 2, we see the same A-curve in three plots, one of Web pages with between 1000 and 10,000 links, one of pages with between 10,000 and 100,000 links, and one of pages with between 100,000 and one million links.

Fig. 2

Scaling: 10K, 100K, 1M Web links

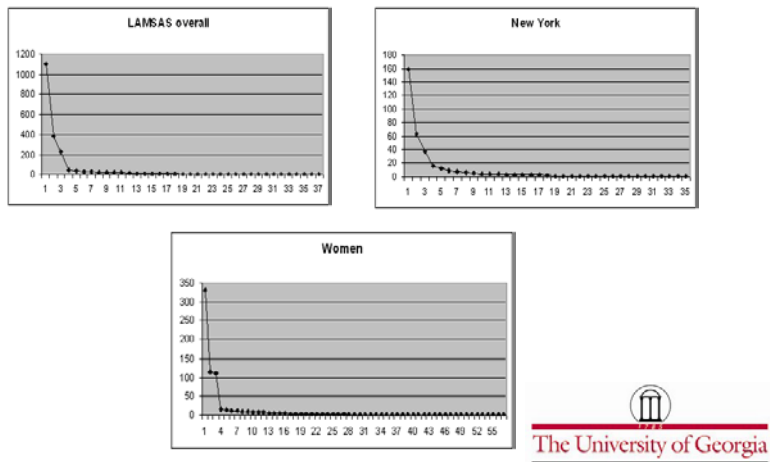


The graphs appear the same at every level of scale; thus, the 10,000 point on the first graph appears very low in comparison with the 1000 point, but the 10,000 point on the second graph appears very high in comparison with the 100,000 point. This is a property that Google exploited to make its first great leap in search engine quality. Scaling in speech takes the form of repeating non-linear distributions for the data overall and for every subsample. Here, for example, we see the distribution of variant word forms for *bureau*, the piece of bedroom furniture where you keep your socks, for my entire

Linguistic Atlas survey in the Eastern States, just for the state of New York, and just for the women speakers (Fig. 3).

Fig. 3 (adapted from Kretzschmar 2009: 202-204)

Scaling: *bureau* curves for All LAMSAS, New York State, Women



The curves have subtle differences, but the non-linear shape appears clearly in each graph, overall and in both subsamples. What is differentiated about the curves for different subsamples is the order of the variants. In Fig. 4, we see that the same variants occur at different frequencies for different groups in the Atlas survey--and that only one of the subsamples reproduces the order for the Atlas survey overall. So, speech data matches the characteristics of a complex system.

Fig. 4

National vs. regional level of scale:
variants for 'heavy rain'

All Type B	Youngest 1/3 Type B	Middle 1/3 Type B	Oldest 1/3	Men	Women	Northern Tier	Middle Tier	Southern Tier	Variants
cloudburst	Downpour	downpour	cloudburst	cloudburst	downpour	cloudburst	downpour	downpour	2
Downpour	Cloudburst	cloudburst	heavy rain	downpour	cloudburst	downpour	cloudburst	cloudburst	3
heavy rain	heavy rain	heavy rain	downpour	heavy rain	hard rain	heavy rain	hard rain	gully washer	4
hard rain	hard rain	hard rain	hard rain	hard rain	heavy rain	heavy shower	heavy rain	heavy rain	3
gully washer	gully washer	gully washer	gully washer	gully washer	gully washer	hard rain	gully washer	hard rain	2

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To return to North America in the seventeenth century, complexity science tells about the process by which order, here a new American variety of English, emerged from the mixture of regional British characteristics among the settlers in every locality. We know that there were massive numbers of exchanges of linguistic tokens—whether words or pronunciation or grammar—deployed by human agents, the speakers thrown together in America. In the early American environment, the immigrants all contributed their own resources of speech as they tried to talk to their neighbors. Given the preponderance of early English settlement, it is no surprise that English features came to constitute the majority of the tokens in the new order that emerged. There were, of course, some contributions from Native American languages or other European languages in the seventeenth century. However, in every colony a variety of English emerged as the everyday language of the founding population of settlers (see McDavid 1958: 483, Zelinsky 1993, and Mufwene 2001: Chapter 2 and 3, for the influence of original settlement populations, the Doctrine of First Effective Settlement, and the Founder Principle respectively). In Zelinsky's words, "the specific characteristics of the first group able to effect a viable, self-perpetuating society are of crucial significance for the later social and cultural geography of the area, no matter how tiny the initial band of settlers may have been" (1993: 13-14). And after such a start, given that speech is a complex

system, the variants available in the population of speakers for any and every linguistic feature began to be distributed according to the nonlinear A-curve pattern simultaneously at every level of scale. Right from the beginning somewhat different sets of variants would emerge as top-ranked elements in different localities. Also right from the beginning, a particular set of variants emerged as top-ranked elements at the highest level of scale, American English. The order that emerged at the national level of scale was not exactly the same as what emerged in any single locality or colony and yet, owing to the scaling property of complex systems, neither was it just an abstraction that avoided the special characteristics of any individual colony, nor was it just a kind of average of speech from lower levels of scale, often called "colonial leveling" or "koinéization." Massive numbers of interactions among the elements in the complex system caused the emergence of noticeable differences, both between American regions and between American and British English--not simple causes like Fischer's supposition of wholesale cultural transference.

Despite the high mortality rates, English settlers continued to flood to the colonies in the eighteenth century. And other Europeans came, too, including large numbers of Germans from the Palatinate starting in 1709. Thousands of Africans were brought involuntarily to the colonies after 1680. These non-English groups contributed to an even more mixed population of speakers. Bailyn (1986: 59-60) notes that Philadelphia hosted a large number of German immigrants, while New York City hosted more Scots and Scotch-Irish, yet overall he reports that:

The population that spread inland from coastal nodes to form new communities was a composite of ethnic and religious groups--Germans, French, Swiss, Scotch, Scotch-Irish, English, Caribbean islanders, Africans, Afro-Americans--carrying with them different cultural baggage. . . . There was no single "American" pattern of family and community organization. There were many patterns, reflecting the variety of human sources from which the population had been recruited and the swiftly changing, fluid situations in which the people lived.

Thus, it is also no surprise that substantial numbers of tokens, whether words or pronunciation and grammatical influences, also emerged in the complex system from non-English sources (see Marckwardt 1958 for contributions from various languages to American English, particularly the lexicon). Even though a new variety of English was established in the original colonies, the continuing operation of the complex system in every colony allowed new variants to be introduced, and sometimes to be preferred, owing to the continuing massive interaction of elements. The operation of the complex system is what allows for what Paul Hopper has called "emergent grammar" (1987):

The notion of emergence is a pregnant one. It is not intended to be a standard sense of origins or genealogy, not a historical question of 'how' the grammar came to be the way it 'is', but instead it takes the adjective 'emergent' seriously as a continual movement towards structure, a postponement or 'deferral' of structure, a view of structure as always provisional, always negotiable, and in fact as epiphenomenal, that is at least as much an effect as a cause.

Hopper did not know about complex systems when he proposed this radical notion, but it is clearly the case that complexity science provides the "how" for the process of grammar, in the larger sense of its pronunciation, lexicon, and syntax, as a variety becomes established and continues thereafter to change.

Let us now consider how Edgar Schneider's 2007 *Postcolonial English* discusses the emergence of new varieties of English in former colonies worldwide. His description of the histories of English in a number of places, including the United States, shows that the emergence of these postcolonial varieties does seem to follow a similar trajectory. His "Dynamic Model" suggests five phases in the evolution of such varieties: foundation of the colony, stabilization around the outside norm, nativization, formation of an internal norm, and diversification. American English began to form by self-organization out of the complex system of linguistic interactions in the new colonies.

"Stabilization around the outside norm" represents the fact that, in America, English was imported as a language because of replacement of the indigenous population. "Nativization" began immediately in one sense, as settlers in every locality had to adopt words to describe local flora, fauna, and places. These were often terms taken from Native Americans, as recorded, for example, in Thomas Harriot's *Briefe and True Report of the New Found Land of Virginia* (1588, cited in Bailey 2004: 4-5), which was based on Raleigh's failed and ephemeral Roanoke colony. The perception of nativization began in the eighteenth century, as British and American writers noted differences between the English of the Old and New World. John Witherspoon, for instance, commented in 1781 that (cited in Mathews 1931: 16)

the vulgar in America speak much better than the vulgar in Great-Britain, for a very obvious reason, viz. that being much more unsettled, and moving frequently from place to place, they are not so liable to local peculiarities either in accent or phraseology. There is a greater difference in dialect between one county and another in Britain, than there is between one state and another in America.

Schneider cites no fewer than four other eighteenth-century writers who comment on the uniformity of American English (2007: 269-270). However, the period comments do more to distinguish American English from British English than they testify to any actual koinéization. The strongly-marked regional dialects of Britain were certainly not maintained in America (*pace* Fischer) owing to population mixture, noted here by Witherspoon. However, the complex system of speech did not create a uniform koiné, but instead somewhat different phonologies, lexicons, and grammars emerged at different scales from locality to locality and from state to state, up to the national level of scale.

It was certainly possible then, as it is now, to describe the characteristics of an overall American variety, one clearly different from Britain as all the commentators tell

us, even though the national description, then as now, was not an exact fit for any local variety. Schneider's "diversification" was already underway, if not yet strongly marked. Witherspoon also noted verbal differences different regions, such as the word *chunks* for 'firewood' in the middle colonies, and *tote* for 'carry' in the southern states. Emergent regionalisms also appear in the writing of Anne Royall, a travel and society writer (Mathews 1931). Some features that we associate still today with American regions were present then, such as r-lessness and other matters of pronunciation, lexical choices like *chunks* and *tote*, and also grammatical choices like *hadn't ought*. This diversification of speech in the original colonies completes Schneider's picture of the initial emergence of American English, although we can say that diversification began to occur from the very beginning and just became more noticeable as the last stage. The stages of Schneider's Dynamic Model thus accord well with the process of the complex system of speech.

The situation for American English after its initial emergence is somewhat different. Continuing diversification is a predictable consequence of the fact that speech is a complex system, because random interactions among the components of speech continue to occur at massive rates. However, in the nineteenth century and thereafter, we need to consider the extension of the speech patterns that emerged in the original colonies, rather than the creation of new independent patterns. East-to-west migration created regional speech similarities in broad bands across the eastern half of the country, described as the Northern, Midland, and Southern dialect regions (Kurath 1949, Kurath and McDavid 1961).

The complex systems of speech in these inland American localities were established, again, by mixed populations of speakers, including some people who had been resident in the original colonies, some speakers who had arrived at ports of entry and stayed some time there (a frequent occurrence), and some speakers who proceeded more directly to the frontier. Some Native Americans were present in the northern parts of the American

East, but still not many because of the spread of epidemics originated by Spanish explorers. In the Southeast the Native American population had had a longer time to rebound after the epidemics had run their course but the survivors were displaced. In my own state of Georgia in the nineteenth century the state militia forced Native Americans out, and new settlers participated in land lotteries to acquire 200 acre sections for homesteading. Under these conditions of the time, the largest proportion of the speakers who settled in any one locality was certainly formed by those who had lived further to the east along the settlement route that allowed new settlers to get to the frontier. As predicted by Kurath (1949: 2) and McDavid (1958: 499), my controlled experiments on survey research data have demonstrated that migration patterns did spread local features inland from focal cities on the coast (Kretzschmar 1996, 2002). The remaining Native Americans and people who came more immediately to available homesteading areas contributed linguistic variants which could become top-ranked in a locality, but which had to compete with variants that were already in frequent use in established complex systems of speech further east.

The process of complex systems thus offers an answer to a problem I raised in Kretzschmar 2002. Michael Montgomery (1989, 1991, 1997) has worked hard to connect Scotch-Irish immigration with dialect features in Appalachia, but he has only been able to find small traces of Scotch-Irish English in the Southern mountains. We know that large numbers of Scots and Scotch-Irish came to the Appalachian region in the eighteenth-century and thereafter, and we can certainly find cultural connections with the Scots and Scotch-Irish in Appalachia, from housing and farming patterns to ballads and songs. Montgomery found that plural verbal *-s* has been retained in Appalachian English as a low frequency feature, and so has the use of multiple modal auxiliaries, but a great many other possibilities that Montgomery checked cannot be connected in this way. The operation of the complex system tells us how such grammatical variants could

be retained at low frequencies on the nonlinear A-curve, in competition with top-ranked usages of verbal -s and auxiliaries. The complex system also explains why the *needs washed* construction, another variant with a Scots and Scots-Irish history, is not found in Appalachia but is found in western Pennsylvania. Owing to the random interactions of the system, some variants will survive in some places and not others. The presence of speakers from some pre-existing cultural group creates the opportunity for variants to be introduced to the system, but does not require that any particular variant will become common or will survive at any measurable level. Indeed, given the extension of eastern complex systems to the west, we might expect on the odds to find just what we see, the retention at low levels of variants from significant cultural groups in the population, within an overall pattern dominated by variants carried west from the coastal areas.

Change has not stopped as we move from the nineteenth to the twentieth century and beyond: the complex system of speech in America continues to operate, and new kinds of order in American English continue to emerge. While more recent descriptions by William Labov and others make claims for a Western dialect region (Labov 1991), relatively recent settlement and low population density in the west tend to undercut the consistency and coherence of any regional similarities there. Labov (1991) and Labov, Ash, and Boberg (2006) describe what they consider to be ongoing sound changes called the Northern Cities Shift and the Southern Shift along with Western Merger. These large-scale descriptions are accompanied by smaller scale changes in local and social settings such that (Labov and Ash 1997: 508):

In spite of the intense exposure of the American population to a national media with a convergent network standard of pronunciation, sound change continues actively in all urban dialects that have been studied, so that the local accents of Boston, New York, Philadelphia, Atlanta, Buffalo, Detroit, Chicago and San Francisco are more different from each other than at any time in the past

Such continuing diversification is a predictable consequence of the fact that speech, language in use, is a complex system. However, the twentieth century brought demographic changes which again changed the conditions for linguistic diversification. Primary settlement of the country by homesteading was already complete, and demographic change thus occurred by internal migration and immigration to already-settled areas. In the first half of the century, Southerners moved in great numbers to the North and West. In the second half of the century, Northerners often moved away from the Rust Belt for work in new industries in the South. These population movements often created speech islands in the regions to which the migrants traveled, such as African American or Southern White neighborhoods in Northern cities. Similar islands have been created in many cities of twentieth-century immigrants from other countries, so that neighborhoods in many cities may have a strong ethnic flavor and even preserve ancestral languages (such as, stereotypically, Polish in Chicago, Chinese in San Francisco, and many languages in New York City). Even so, the major patterns created by historical east-west settlement largely persist, so that variation and change at the scale of neighborhoods and cities still occurs within larger traditional regions.

More important, however, has been an essential change after World War II in the urban demographic pattern from residential neighborhoods within cities to the model of an urban core surrounded by suburbs. Suburban housing changed the spoken interactions of the community, because people no longer lived with the people they worked with (see Milroy 1992). Moreover, American suburbs cater to different economic groups because of similar housing prices in different developments, so people of different economic means mingle less on a daily basis than they used to. Weak ties tend to promote the transmission of features from group to group, not the maintenance of strongly marked features within a population group. At the same time, late twentieth-century improvements in transportation like highways and airlines created a super-

regional marketplace for the highly educated. Traditionally, Americans at all levels of society tended to remain in the regions where they were born, so that all social strata could share regional speech habits. Now, the most highly-educated segment of the population is mobile nationally, which has led to the idea that highly-educated speech should not sound regional. Highly-educated speakers in formal settings tend to suppress their regional features (Milroy and Milroy 1999) owing to suburban housing patterns that separate them from less-mobile economic groups. The typical speech of national news broadcasters is a symptom, not a cause, of this situation.

My intensive long-term research in Roswell, GA, a suburb of Atlanta, can serve as an example of what happens locally under these conditions. We have recorded representatives of two founding Roswell community cultures, members of prominent families and townsmen, and members of the historical African American community. Our preliminary findings are that the older members of these groups do share many features of what might be called a core set of Roswell speech habits. This Roswell speech generally belongs to the traditional Upland Southern pattern, which can be distinguished from the Plantation Southern speech type of Coastal and Middle Georgia. Using this data for acoustic phonetic analysis, Andres and Votta (2010) have found that neither the African American speakers nor the white speakers in Roswell follow Labov's Southern Shift, and neither do the African American speakers conform to the model of a national African American English. In the Roswell complex system of speech, what matters most is the random linguistic interactions of people who actually live there, as opposed to what Andres and Votta call "a monolithic approach to correlations of linguistic features and regional or social features, whether it qualitatively divides the North and the South, African Americans and whites, more educated and less educated, or men and women" (96). Local variation exists on its own terms, according to the scaling property of complex systems.

The situation among the youngest Roswell speakers we interviewed, all of whom have had access to higher education, can no longer be considered to participate in the Upland Southern pattern, or to show consistent evidence of the core Roswell speech of their parents and grandparents. As Josh Dunn has shown (2010; Fig. 6), younger white speakers have highly variable rates of production of traditional Southern pronunciation features.

Fig. 6

Dunn (2010): Incidence (%) for 12 "Southern" Features in Roswell

	1: u front	2: piɪ/ pen	3: oi→ o	4: ai→ a	5: init stress	6: loss -r unstr	7: clawg vowel	8: [əou]	9: reverse i and l	10: [æu] [æi]	11: loss -r	12: ə insert
A	3.8	45.7		45	41.4							
B		31.3		5.6	31.1							
C												
D		14.7			26.2							
E	26.3	28.2		25	34.7	3.6	8.9	12	8.5	32.5		
F	27.2	17.1		81.1	35.7	9.1	5	2.5	8.5	46.7	13.3	10.2
G	8.75	15.7	2	4.4	35.1							
H	17.4	67.7	2.1	64.6	36			20	10			
I		4	1.7		9.6							
J		2.7		1.9	20							
K		63.9		35.4	44.3			19.3	14.5			



Dunn counted tokens for twelve variants considered in the literature to be General Southern, Upland Southern, or Plantation Southern characteristics (as per Kretzschmar 2008). One young speaker (C) had no such characteristics in an hour-long interview but all of the others did. All of the younger speakers showed fewer Southern characteristics than the "most Southern" speakers of their parents' and grandparents' generation (here E

and F). One older speaker had low rates of occurrence for two "plantation Southern" variants (11,12), and both older speakers had at least some tokens of each of the traditional Upland Southern variants (6-10). Only two of the younger speakers had any tokens of specific Upland Southern variants (H, K), and only two of the five variants at that (8,9). But some younger speakers used General Southern features at higher rates than their elders. The speakers from the older generations were themselves not categorical in their use of any Southern feature, which means that they employed non-Southern variants instead. Figures like these are not well explained by contemporary sociolinguistics, which assumes that there will be more homogeneity than this in a speech community. Complexity science, on the other hand, predicts the degree of variability that we see in Roswell. Among these speakers we see competition between variants that results in differential frequency of occurrence. We look forward to doing further work in Roswell, especially among younger speakers, to see what variants are in use and at what rates. Even now, we can see that the youngest generation can be characterized by a preference for General Southern features, not the complete suppression of such features suggested by the idea that highly-educated speech should not sound regional, and not the perennially popular idea that dialect speech is disappearing in favor of Standard English.

Complexity science is the model that can cope successfully with the problems of language variation and change that we are interested in solving for the history of American English. Complexity science addresses the emergence of a new American variety, along with its component regional varieties, more adequately than traditional approaches. Complex systems replace the notion of monolithic "language contact" or Fischer's "cultural shift" with interaction between speakers. Complex systems can deal with the extension of existing varieties into new areas, and still account for the evident

acquisition of new variants from important cultural groups in different areas. Finally, complex systems can cope with contemporary American cultural change and attendant language change, again without recourse to monolithic thinking. We are just at the beginning of research to understand the operation of the complex system of speech, but it is already clear that it gives us a good way to describe how the process of emergence and change really works.

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