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Why Count Words?

Folklore's Contribution to the Computational Model of Narrative

WHY COUNT WORDS

"Why count words?" It was a simple question[1]. The person asking the question did not ask it in an overly skeptical, or hostile, fashion. He was honestly taken aback by a series of numbers I had rattled off that corresponded to a collection of texts, of legends, that I had assembled as my first step in my exploration of computational approaches to narrative. The illustration in front of the room had been a bar chart of sixteen legend texts, each collected by an established folklorist (and so the original oral texts were, I felt, reliably represented). The longest text in the collection was a little over one thousand words (1025); the shortest, only 150.

A multiplier of seven is not an order of magnitude in difference, but it is still enough of a spread that it bears further investigation. Mount Everest is, for example, seven times taller than Ben Nevis, the highest mountain in the British Isles. Climbing the former is considerably more prestigious than climbing the latter. The Gross Domestic Product of the U.S. is seven times greater than Brazil. The distance from New York to London is seven times greater than the distance from New York to Washington, D.C. The difference in the latter amounts to a change in continent and a trans-oceanic passage.

My initial answer to the question was simple: I counted words because I wanted to know if it is possible to create a story world using 150 words, and, if so, then I want to understand how that can happen. Given the size of a great number of literary forms, one thousand words is already amazingly concise, but 150 words? Each word must pack an incredible amount of power: something made even more amazing when one realizes that only half that number of words are unique in their usage in this little text. That is, one word alone, *he*, gets used twelve times. The next nine words that get used most often in this little legend are also fairly uninteresting: *and*, *a*, *was*, *the*, *it*, *his*, *said*, *to*, *they*. So a list of the text's top ten words doesn't reveal anything about the story itself, except that, perhaps, there is a singular figure, *he*, who is counterposed against a group of some kind, *they*. (It is only when we get to the next ten most often used words, all of which appear only two or three times in the text, that we beginning to get a sense of what the story might be about: *man*, *dog*, *with*, *when*, *went*, *there*, *saw*, *off*, *horse*, *controller*.)

How is this possible? How can such a small subset of words from an already small text make a story go? That is, I think, the real question. Counting words is but one step along the way, but an important one, and one that we, as folklorists, have failed to undertake. Think for a minute of all

the texts that are indexed in the great collection projects of the twentieth century. Add to them all the texts we have collected under the auspices of the ethnography of speaking. It's an impressive amount of work, and while we have made some synthetic gestures, we have, by and large, mostly focused on differences. All of those differences are, of course, quite compelling, but in focusing on differences, we have also missed an opportunity to make attempts at larger kinds of claims about human nature and culture.

The impulse to count words, for me, is but one step towards a larger understanding of how humans think their way through the world through things of their own making. In the case of texts, they quite literally string one word after another, usually within the flow of a larger program of discourse that itself may or may not be conducive to text-making. Despite all the complexities, people in a variety of speech act contexts somehow decide to initiate a text, place one word upon another in a sequence they both anticipate and, at the same time, manipulate, until they are satisfied, in some fashion, with the result and, like a discursive Atropos, end the life of the string.

Counting words, then, is but one step towards a larger understanding not only how many words, but which words, and in what order. Why these words and not others? And what are the relationship of these words used here to instantiate a story world, but of the actions within the story world to the human world within which they are embedded? In short, what can 150 words tell us about the relationship between words, ideas, and actions?

The great indices of the previous era of folklore scholarship took one step in this direction by attempting to map, mostly in bibliographic terms but indirectly in cartographic, the various texts that had been collected in the initial wave of the philological project. At the same time as Stith Thompson turned his great carousel to compile the Motif Index three-by-five card by three-by-five card, however, a few scholars and scientists were beginning to play with the idea of using computers, as slow and expensive as they were then, to compile statistics about texts[2].

Statistics remains, for most humanists, either an enigma or an enemy. It represents, for many (and with good reason), a regime of mathematics, itself something of a mystery, which has been used too often to summarize a situation or a group of people when a more subtle form of analysis was needed. I will not, in this essay, defend its use in such contexts. Nor am I interested in defending, or capable of discussing, the larger statistical turn that so many forms of knowledge production have undertaken. I have only this, a reworking of a dite from my own childhood and perhaps yours too: just because others are doing it is not a reason for us to do it, too.

I understand very well the humanistic impulse to draw a line in the discursive stand and to cry out "the crunching of us into numbers ends here." My suggestion here, at this metaphorical line lying before us, is that the crunching will go on and on, and it can do so either without us or with our efforts not only to humanize the crunching but also to stuff it so full of the human that it might very well turn into a new kind of science, a new kind of scholarship that will not only be interesting to others, but also to us as well.

One of the central requirements of statistics is that you must convert information — perhaps a simply little story about a treasure buried somewhere, perhaps a few dozen of such stories, or

perhaps several thousand — into data. But such a transformation amount simply to assigning values, most often numbers but they need not be, to the objects that are central to the problem. The analyst defines the problem, and the analyst assigns the values. Folklore studies has already done this in the form of tale type numbers, and motif numbers, and even when we describe the process of contextualization of a particular text.

So why count words? Well, clearly one reason to do so is simply to explore texts and textuality, to satisfy our curiosity about the fundamental dimensions of human expressivity: the number of words in a text, the word clusters (or collocations) that occur within a text as well as the words that always appear in conjunction with others in particular kinds of texts (co-occurrences). A second reason to proceed in this fashion is to make it possible to discover relationships between texts that we have not yet discovered by more traditional means of study. Discovery, indeed the notion of indexing itself, are the chief reason behind so much of the effort in natural language processing, as we will discuss in a moment. The final reason is that by seeing folklore texts in a new light and seeing relationships between texts that we have not gleaned before leads to new forms of knowledge, forms that need not displace but rather refine and extend current ways of knowing.

#

SCIENCE AND STORIES

To glimpse the power of this way of working, and to begin to understand how much work is already ongoing in this domain, let us begin where many of us begin when faced with a new or unfamiliar idea or topic: with an empty box on a web engine search page. In our present moment, none of us is surprised when, as we type, the empty box begins to self populate with possible completions of our query. As I type N-A-T-U, for example, the search engine offers me *nature*, *natural selection*, *nature's sunshine*, and *natural family planning*. As I complete the first word of my question, which was indeed *natural*, and I begin to type the second word of my query, L, the engine offers me *natural log*, *natural law*, *natural laxatives*, and *natural log rules*. With only the second letter of the second word of my query typed, the engine has already "guessed" correctly that natural language processing is my topic.

This ability of the search engine to complete my query ahead of me is, of course, a function of the incorporation of natural language processing, or NLP, into the search process itself. A product of a number of long intertwined areas of inquiry, most prominently linguistics and computer science, NLP has made a significant leap in its abilities in the last decade, thanks mostly to the ever increasing amount of natural language materials ingested by the internet. From the thousands of novels in Project Gutenberg to the millions of tweets and Facebook updates posted daily, we slowly moving toward that moment when the full spectrum of human scribal expressivity is available for computational analysis, modeling, and programming.

Scribal, of course, is limited to what is entered directly through human fingers pressing keys and what can be hazarded by means of scanning and optical character recognition. As any who

has worked with OCR can tell you, one automates its ingestion of large texts or a large number of texts only with a great deal of careful setup, oversight, and hours upon hours of tedious manual correction. Manual correction is so much a part of the ingestion process that there are entire architectures designed to draw human beings into the process, from Google's captchas that presented interface users with bits and pieces from Google Books to the elaborate efforts of various historical archives to involve scholars of all stripes in the proofing process.

But what of oral discourse? The language that most of us feel is most "natural" is largely to be found on-line as dialogue found in novels and plays, as court transcripts, and as handfuls of oral collections that have been published to the web in a way that make them readily accessible. (And so partly this is a plea to folklorists to consider making more of this material available and working within standards set by open access organizations.) The relative dearth of carefully transcribed oral material that represents traditional ways of speaking and making our worlds through words has not, however, dampened interest in folkloric materials or, for that matter, folkloristic theories.

Oral discourse is tantalizing to information scientists for several reasons. First, because: oral discourse is more like how many people write than a great deal of written discourse. As Bird, Klein, and Loper note early in their introduction to *Natural Language Processing with Python*:

> It takes skill, knowledge, and some luck, to extract answers to such questions as: *What tourist sites can I visit between Philadelphia and Pittsburgh on a limited budget? What do experts say about digital SLR cameras? What predictions about the steel market were made by credible commentators in the past week?* Getting a computer to answer them automatically involves a range of language processing tasks, including information extraction, inference, and summarization, and would need to be carried out on a scale and with a level of robustness that is still beyond our current capabilities. (27)

Moreover, as the very conversational nature of the questions quoted above reveal, speech recognition is the next frontier in search. Many of you here in this room have used *Siri* or *Google Now* to add a reminder to a list or to send a message to one of your contacts. And many of you are well aware of the limitations of these services, despite the fact that both relay your spoken discourse to massive server farms and apply monumental amounts of computing power simply to parse the expression "Add milk to my grocery list."

In addition to the spoken dimension itself of oral discourse, researchers have been interested in the variety of folklore genres. At the macroanalytical level, the long-term stability and widespread appearance of certain genres has intrigued network theorists interested in "how properties of complex systems emerge from the interactions between component parts in a non-trivial manner" ({Carron:2012ii}: 28002-p1).[3] At the microanalytical level, researchers have been interested in how to parse traditional discourse reliably in much the same way that sentences can now be parsed by a number of NLP algorithms. A number of these latter researchers have, in fact, turned to the work of Vladimir Propp and have explored the possibility of applying his seminal

morphological analysis of a small set of Russian folktales to other kinds of narrative materials.

Propp's *Morphology* is required reading for all folklorists, who are taught to admire its precision, but typically don't know what else to think about the text, representing as it does a previous era's focus on categorizing texts by genre rather than understanding how texts are used to create social realities which they also often represent. For many folklorists, the large text collections that were the focus of the field from the middle of the nineteenth century to the middle of the twentieth are leftover cartographic data from a moment when the discipline was more concerned with tracing the evolution of ideas and the history of peoples. But there was always another dimension to these large-scale projects, of course, and it would seem that computer scientists have stumbled upon it: the possibility of creating an externalized, working model of the human mind itself.

If we had more time — note to self: here's where you expand things — we might sketch out a fuller prolegomena, but since this is a lunchtime talk, what you really need is something decidedly not a prolegomena, but a text, a story, if you will.

#

THE STORY OF A PIRATE IN A TREE

Our story begins with an enigma thrust upon me over a decade ago. I was interviewing an African American man in a small town in south Louisiana who had been recommended to me as a talented performer of rhymed traditional poetry. Moving easily from text to text, the man, who I will introduce in a moment, eventually shifted from poems to jokes, and later to legends and anecdotes. In the midst of our afternoon together, he told me a couple of legends about lost treasure. One legend included an account of an exchange between the teller and a pirate sitting in a tree. The story ended ominously, with the pirate cursing the fate of the storyteller. I had no idea what to make of such a strange, and estranging, tale, which the man told me with such intense honesty. The story haunted me, figuratively, for many years, until I finally decided to try to find an explanation for its appearance in the repertoire of a man who otherwise seemed quite grounded in reality.

The legend is told in first-person by Oscar Babineaux, an African American man who was born, grew up, and has raised his own children in Rayne. He is known throughout the African American community of the town for his ability to perform, and perform well, a wide variety of discourse genres, which in common parlance are known as "shit talking." Oscar Babineaux can talk some shit, people will tell you, and they mean that in the best possible way.[4]

I recorded the legend and other texts in July 2000, and it is one of several legends Babineaux told as *memorates*. I had approached Babineaux because his daughter had played for me a recording she had made of her dad performing an African American toast with a rural setting. As some here may know, most contemporary African American folk culture is associated with urban settings, but there are deep rural roots as well as contemporary rural practices that are worth further study. In addition, according to his own performance ethic, Babineaux felt obliged to draw

me in, and because I was not his usual audience, he ended up telling me a bunch of legends. (We can discuss why if anyone is interested.)

All of the legends he told me were vivid first-person accounts, rich in dialogue and drama. A number of them featured common motifs found throughout a number of Louisiana folk cultures, but never before had I come across a talking pirate. In the legend that follows, an adult Babineaux stops by his family's home place and discovers his family is, once again, digging for money. He prays with some members of the family, and then he joins his nephew in bringing water out to the people digging. Along the way, they encounter a pirate up in a tree who asks for something to drink. At first they comply, but when they later refuse, the pirate threatens them, at which point a shovel flies through the air, and inserts itself into the tree.

#

BABINEAUX TEXT

Like I said my family was weird. They liked to dig for money and stuff. Said my grandfather had left us some money. And they was digging for it. So one day we went, and I was at work, so I can see, we at a country spot, like our property. So I can see a lot of people dressed in white. So I'm curious me. I said, "Well, shit, what the hell is everybody doing out there dressed in white? I wanna see." So I goes out there. So they tell me, "You're working right now, just go home come back. You know, come back after work."

So I goes back, man, after work. So, they all in the house. We all praying man, everyone's on their knees praying. They got an excavator in the back yard, digging. [Laughs.] You understand? Find this money, I guess. We're on our knees, man, we're praying. It's like in the pit of the summer, like here. No wind nothing.

They had a wind come through the house. That wind was so strong my aunt was holding onto the door like that, and both her legs was in the air. That's how strong the wind was. In the house.

So they said … they picked me, my nephew — the one I was telling you that talk all that shit, and my little niece to go bring some water to the workers in back, the one that was doing the work. So we got to walking. We passed on the side of the house to bring them.

So my nephew said, "Say man you see that guy in the tree?"

I said, "Man fuck I don't see nobody in no tree."

He said, "Yeah man he be right there sitting on that limb."

I said, "I don't see nobody man."

I'm getting scared now.

Man I don't see nobody.

But he's seeing this, you know.

So he said— I said, "How he look?"

"It's a guy," he said, "it's a guy dressed in a pirate suit, man."

He said, "He got a pirate hat on. He got a pirate jacket." And he started talking to him

The guy in the tree started talking to him, while he's telling me this. But the guy in the tree is telling him: shut up don't tell me that

So he telling me, "Man, look he right there. You can't see him? Look he right there on that branch."

He say, "He want something more to drink."

You know, because what they had did: they'd put a bowl in the back yard, under this tree, with some alcohol in it. You understand?

And I don't know if it was the sun that would dissolve it, but it would be gone.

Okay, so he say he say, "Man, he want another drink."

So I said, "Fuck man don't tell me that ."

I wanna get back in the house.

I said, "I don't see nobody up there."

So we kept on walking. We went out there. We brung them some water. So on our way back.

Look at him.

He say, "See you, you son of a bitch."

He say, "You don't wanna give me another drink, huh?"

He say, "You gonna be just like me."

He say, "You see this here peg leg?"

He say, "You going to be just like me."

He say, "For this out here y'all are going to have to lose something."

So, man, it got kind of scared. We started walking fast. By the time we got to the house, I broke out a run. A shovel, man, come from the back of the house. I mean full force.That shovel stuck in that tree so deep we had to dig it out with an axe. It stuck … you know with a shovel, it's hard to stick a shovel into anything. That shovel went inside the tree halfway.

#

AXES OF COMBINATION AND ASSOCIATION

So, what is that pirate doing up in a tree and why is he threatening a bunch of African Americans? The answer is more interesting for the route that it takes us through adjacent cultures and into history.

The legend is one of 20 from a larger corpus I compiled, all of which were collected in Louisiana by folklorists like myself:

> Four texts are taken from Barry Jean Ancelet's *Cajun and Creole Folktales*;
> Four texts are taken from field research done by an undergraduate student, Jeffrey Broussard;
> Two texts are taken from my own research among African American speakers in the Louisiana town of Rayne; and
> Nine texts are taken from the *Swapping Stories* collection, with a tenth text taken from unpublished materials gathered for the collection and made available to me.

The smallest text in the oral collection weighs in at a mere 67 words (BRO 004) and the largest text at 1025 words (LOH 164), giving us a a normalized range of 7-to-1.[5] At 652 words, the Babineaux text is one of the longer texts in the oral collection — it's about three minutes long in its telling.

Unlike texts I collected from scribal sources that tend to focus on the origin of the treasure, most of the stories in the oral collection focus, as our legends does, on the experience of looking for treasure, with only a handful treating the origin. Two texts include both, which I take as evidence in the larger project that what we have is a morphology wherein the experience, which I label *tau*, dominates in the oral tradition and the origin, labelled *alpha*, dominates in the scribal traditions.

The four texts in the oral collection that consist of only the *alpha* component include a report from Broussard's collection (BRO 4) and three texts from the *Swapping Stories* project (LOH 157, LOH 162b, LOH 163). The two texts that feature both a *tau* and an *alpha* component have opposite order: one is in chronological order, *alpha-tau* (LOH-162), and one in experiential order, *tau-alpha* (LOH-160).

If we focus on the component, *tau*, that dominates the oral legend collection, we can discern a distinct branching: in four of the texts, the treasure is actually found and secured. In the remaining ten texts, either there is a supernatural phenomenon (typically, a bull or a wind) that scares the seekers away or they do not realize what they have found, usually a stone slab or tomb.

I should be clear that I arrived at this morphology the old-fashioned way, by hand, but it is, I hope, the beginning of a longer journey to explore the possible automation of morphological components using ever bigger corpora. In his review of Propp's work, Mark Finlayson notes that he was drawn to folktales because of their "Darwinian-like natural selection process, in which portions of the narratives that are congruent with the culture are retained and amplified, and those that are incongruent are distorted or discarded" (2009: 127). The work in computer science and computational linguistics tends to focus on characters as actants within distinct environments whose social networks can be graphed — this is, in fact, what the study of myth I cited previously does. Finlayson's is one of the few that I have come across that seeks to build computational models of narrative using Proppian morphologies as their foundation.[6]

The goal of these studies has been to develop computational methods of analysis for a given set of stories. The goal in doing so is both to speed up the process as well as to remove the ambiguity inherent in many human-generated results. That is, how much a particular morphology, for example, owes to the analyst, who may have been influenced by other morphologies; how much such a morphology reflects the narratives being examined; and how involved any verification of such a morphology must be. Most methods, for all their interesting moves—using such things as Bayesian models and analogical story merging—unfortunately depend upon a transcoding of narratives into a computer-readable format. Quite often this transcoding means that larger chunks of discourse get reduced to plot summaries and the analyst must, perforce, transform actual words used to analytical terms that are capable of comparing one narrative to another.

In my own work, I confess I was rather startled to discover that all the treasure legends I had gathered had the same form, which, as seen above, I am calling τ-α. In this case, *tau* is the experience of seeking treasure, often located within the personal past, and *alpha* is the securing or

loss of the treasure in the more impersonal, or perhaps *legendary*, past. Not all texts have both parts, but I am confident enough in the similarities between those that do and the standalone legends that are either *tau* or *alpha* to say that in some fashion the other part's presence can, analytically, be inferred. This is an important distinction. I am not suggesting in any way a devolution of an uber-legend that has all its constituent parts, but making what I think is the rather interesting observation that I have twenty texts, and of those twenty texts, fourteen consist solely of the experience of seeking treasure (τ); four are only about how a treasure came to be where it is (α); and two contain both parts.[7]

There is a lot more to be said about these components and how they play out across the collection, but today we are concerned with how that pirate got in a tree and why he is threatening African Americans. With that in mind, when we focus on the origin stories, we find the following:

- In one text (BRO 4), pirates shoot a crewman so that his ghost will protect the treasure.
- In a second text (LOH 162), a family fortune is first buried in a barrel of flour and then when the money is transported west by a family member, and *two slaves*, the family member dies and is buried with the money by the slaves.
- In a third text (LOH 164), a slave is killed after promising to look after the family fortune so that his spirit "would continue to guard the money."
- In a fourth, rambling story with little to recommend it beyond the idea of there being gold still buried somewhere (LOH 157), a dead man is attached to the treasure and transportation is involved, a regular feature in the *alpha* narratives.

A rough sketch of an ideational network would report the following associations: treasure, tree, dead man, pirates, slaves: *Figure*. Is there, then, a text that allows us to bridge from slaves to pirates in a way that is other than the two occupying the same role within this corpus?

There is another text that points the way: LOH 163 tells the story of famous pirate Jean Lafitte moving to Texas to escape being arrested for all the things he has done wrong, while also referencing what he has done right. Lafitte takes up residence in Galveston, but still conducts business in Louisiana. One day he has to abandon a ship in Sabine Lake, full of treasure.

What kind of treasure might be found at the bottom of the lake? As it turns out, there are a number of historical accounts that indicate that pirates were involved in the slave trade, and one of those accounts turned up in the web collection of the corpus:

> By 1817 the privateers of Jean Lafitte and his predecessor, Luis de Aury, were capturing numerous Spanish slavers off the coast of Cuba. The pirate's barracoons, or slave pens, on Galveston Island were often swelled beyond capacity, containing a thousand or more African chattels. Many buyers came to the island to buy slaves at $1.00 per pound, and three brothers, John, Rezin, and James Bowie, were among the pirate's best customers. In

> 1853 John Bowie recorded in "DeBow's Magazine" that the brothers, who channeled their illicit slave trade via Black Bayou on Lake Sabine or via the Calcasieu to Lake Charles, realized a net profit of $65,000 in two years time from the sale of 1,500 Africans in Louisiana. [TN 8]

Such an account as this one reveals a clear association between slaves and treasure, through piracy. Slaves were the treasure, and they were traded in the border areas of the new nation. Without saying it, and perhaps without knowing it directly but feeling the rightness of the connection, Oscar Babineaux maintains a legend with a powerful historical lesson.

There's more to this story … and to the analysis, and while the network graphs and morphologies were composed by hand, there was a great deal of computational exploration and charting that went into the work. By way of example, and as a possible discussion topic, one of my concerns going into this study was to begin to figure out a way to compress or abstract actual discourse into motifs, which, as we glimpsed in Finlayson's work, is a tough nut to crack. A quick look at the various terms used for treasure in this small collection of texts tells the tale: a handful of terms which rarely overlap. While you and I know that treasure and gold are the same thing, how does the computer? And so, at the moment, I am trying to work out some form of describing motifs in a way that allows for walking a synset to look for hypernyms and sister terms.

The goal I have for this work is to explore the dynamic intersection between *ideas*, which when taken together construct something like themes or ideologies, and *events* in a story, which we typically understand as sequentially structured. On the one hand, a network, or networks. On the other hand, a syntax, or a morphology. The larger project focuses, for the time being, on legends because, it seems to me, they offer several advantages for this kind of exploration: they are frequently the most bare bones of stories; they are often flexible in form, with sequences inverted while meaning remains stable; and, finally, they are often collaborative in nature, involving multiple speaking subjects, assuring us that their meanings are indeed shared. I want to be clear that I am the beginning of my exploration of computational studies of narrative. I think that there is a very interesting middle ground of verbal genres that have the advantage of both being proved to be meaningful in discourse through repetition in performance and of being of a much more useful middle — dare we say central? — size. Such material is, of course, the stuff of folklore studies.

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NOTES

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# # #

1. The first public presentation of this research project was at the 2013 meeting of the International Society for Contemporary Legend Research. I would like to thank that group for their incredibly generosity and hospitality.

2. The image of Stith Thompson sitting in a building dedicated to housing a carousel forty-feet in diameter is one that I owe entirely to Henry Glassie.

3. It should be noted that there is, to some degree, an assumption that oral discourse is an extension of the "natural" world in a way that other forms of discourse are not. I have yet to find a robust conversation between scientists and humanists on this matter.

4. A brief note here to explain that shit talking is the local term for joking, telling stories, and reciting poetry as well as for trading insults and play ing verbal tricks on one another. E.g., woman who played with mother's day.

5. Note that the Broussard texts are not included in this discussion of length because they are represented more as reports of legend performances than as actual transcriptions of the performances. All of the Broussard texts are shorter than the shortest transcribed text in the rest of the collection.

6. Mark Alan Finlayson was fascinated by the idea that "all morphologies seem to share a common high-level structure … and have significant overlap in rough identity of the functions, but vary considerably in specific function sequences and other details" (2009: 128). Elson has focused on building a thematic model of actant-event scenarios in order to discern story similarity and analogy (2012).

7. Upon realizing this, that I had so many stories that were so much the same, I double-checked the procedures I had used for acquiring texts: had I left out stories that should be included? Had I intuited earlier than I realized a pattern that then determined what texts I chose to accept into the collection? So far as I can tell, nothing of the sort occurred. I went looking for any and all texts that mentioned treasure in some fashion, whether it was called simply money or gold or coins or anything else. I gradually broadened my scope to include stories that suggested the possibility of an unknown reward or bounty, but such broadening should only have brought more variety to the possible structures of the texts, not a narrowing.