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Permalink

<https://escholarship.org/uc/item/6z45t5k4>

Journal

Journal of Pragmatics, 6(5-6)

ISSN

0378-2166

Author

Colby, Benjamin N

Publication Date

1982-12-01

DOI

10.1016/0378-2166(82)90020-0

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NOTES ON THE TRANSMISSION AND EVOLUTION OF STORIES

BENJAMIN N. COLBY *

Matters of interest, salience and chunking in stories all lead to basic questions in anthropology and psychology and in the new field of cognitive science. The way in which stories evolve is a special case of the general evolution of cultural patterns. In anthropology evolutionary theories have suffered because few investigators moved down to the level of microanalysis where the actual mechanisms of cultural transmission operate. Psychology, on the other hand, has suffered by emphasizing a top-down approach where higher level categories were made up on an *ad hoc* basis before being subjected to experimental verification. It is the interaction between patterns and schema that must be focused on. One cannot analyze the evolution of stories without looking closely at the broader cultural base in which they are embedded. It requires an analysis of the behavioral logic that underlies these stories and the way in which elements of the stories are made more salient and valuable to the individuals that are involved in them as well as a study of the particular elements and structures of the stories themselves.

1. Toward a theory of stories and culture

1.1.

Story analysis is moving away from an arbitrary interpretive mode toward an empirical one involving tests and analyses. These are leading to cumulative findings in semantics and pragmatics that involve rhetorical phenomena at a higher level of analysis than the clause or sentence. The results are likely to inform theory building in core areas of psychology, anthropology, and other social sciences. Many of the critical issues in these developments have been identified and discussed by Beaugrande in this issue. Here I wish to contribute an anthropologist's comments about them, particularly, about those issues that are of special relevance to culture theory.

To move most rapidly in this developing science of stories requires that we encompass structural and processual phenomena alike. We must develop an anatomy of narrative and at the same time study the way in which narrative changes as it is passed on from one individual to the next in a process of

* Author's address: Benjamin N. Colby, School of Social Sciences, University of California, Irvine, CA 92717, USA.

microevolution. By studying living oral traditions we shall be able to move further along in our knowledge of how stories are understood and generated and, more anthropologically, of how people see the world and develop a behavioral logic for living in that world.

Recent work in anthropology has focused on natural, or cultural, models, such as games, which provide a means both of expression and cultural learning (Roberts and Sutton-Smith 1962; Roberts and Chick 1979). That is, games and other models take some aspect of the real world in encapsulated form and develop it in a patterned manner which facilitates the learning of cognitive and expressive styles. The most important type of cultural model is narrative. In stories interesting and complex aspects of the real world are reduced to the most relevant essentials for us to learn. Such cultural encapsulation is the real nub of interest for anthropologists. It is a key goal for ethnographic understanding.

1.2.

But to get at the content of this encapsulation it is necessary to learn about its structure and the processes by which it is passed on, modified, and changed in microevolution. A theory of stories that is useful in anthropology will, accordingly, have to cover (1) the way in which stories are put together in a variety of units and structures and (2) how stories change and how elements within those stories are scrambled and reordered in interaction among story tellers and story listeners.

To do this we need a theory that deals with the patterns as they are observed in the external world and with the mental structures that have been learned from those patterns, mental structures that recreate patterns in new productions. Such a theory requires that culture for some group of people (G) be defined as the sum of all the schema systems (S) in the minds of the individual members of that group and all the cultural patterns (P) available to, or observed by, those individuals:

$$\text{Culture}_G = S_i, P_i \quad \text{where } i \in G$$

It is crucial to tag cultural phenomena as either external or internal in the manner above. Internally we can speak of schemata in the mind of an individual. Externally we can speak of the pattern the individual perceives and interprets by means of his schemata. A cultural pattern is a sequence, arrangement, or other regularity which the individual perceives in some artifact, process, or situation that results from a cultural production (such as a written story) or from human behavior (such as a spoken story). The dynamic process between the inner and outer worlds is the crux of all cultural processes. This fact has been forgotten in the otherwise interesting theories of cultural evolution being developed by Lumsden and Wilson (1981) and Cavalli-Sforza and

Feldman (1981). The concepts of "cultorgen" offered by the former and "culture trait" by the latter both fail to deal with the interaction between mind and external world because these concepts do not distinguish the two. They indiscriminately lump artifacts and ideas together. In contrast a pattern-schema approach allows a theory to deal with the inner systems of cognitive schemata as they are utilized to create cultural stories instantiated in the patterns regardless of whether they be patterns of sound waves or printed letters on a page.

2. Strategies for pattern discovery

To develop such a pattern-schema theory as it applies to stories will require that we attend to phenomena that previously have not been discussed or that have been delimited only vaguely. Determining what the story patterns are, requires distributional analyses that can yield descriptive grammars. A descriptive grammar is derived from an analysis of a large number of stories of a particular type within some cultural group. As with a linguistic analysis it is necessary to work from the bottom up rather than from the top down. It is too procrustean to impose categories of what one thinks a story grammar should contain and then work down to the actual realization of those categories. The anthropological approach is usually the other way around: to look at the actual story content and the structuring of that content and, in a distributional analysis of a large sample, work up to the higher level categories. In this way one approximates what is variously called the psychological reality, or cultural validity, of the patterns.

In determining the psychologically real patterning of stories, we try to find basic cognitive chunks. This search is of interest to psychologists and anthropologists alike. The work of Mandler and Johnson (1977) contributes to such a goal. In psychology there are other ways of doing this which look promising. Determining basic story constituents through experiments of reading fluctuations is among these ways.

In anthropology the goal of finding structures and categories inherent in the material has been a recognized one for the last three decades at least. It is sometimes described as the "emic quest" on the analogy of how a distributional study of phonetic elements in some language leads to a phonemic inventory for it. Anthropologists have long tried to do a similar analysis at higher levels. The usual approach is to do a study of the distribution of story elements until, after examining many stories, stable elements emerge which, presumably, are "emic" (Colby and Colby 1981). This emic quest has been one of the guiding principles in cognitive anthropology ever since the early papers on componential analysis and taxonomic structures appeared in the late 1950s and early 1960s. But it did not carry over to story analysis until very recently.

Beaugrande sees the failure to seek an emic goal as a major problem in structuralism where there is no lack of imagination in the creating of structures but a great lack of empirical testing (see Beaugrande this issue: 1.7-1.9).

3. Grammars

3.1.

Part of the emic quest recently has involved the search for grammatical rules which, like their constituent elements, are psychologically valid. All those stories which could be encompassed by a narrative grammar constitute, as Beaugrande says, the scope of that grammar. Ideally the scope of a grammar should coincide with a well-defined genre. Patterns found by means of distributional analysis (Propp 1968; Colby and Colby 1981) underline the importance of genre. But the use of the genre concept during distributional studies involves a kind of bootstrap operation. One's sample of analysis should be restricted to a particular genre but genre is eventually defined (after a series of progressive approximations) by the grammar that results from the distributional analysis.

Beaugrande mentions the Black and Bower example (1980: 231) as showing that in excluding nonstories, the criteria were indecisive and not well defined in current grammars. Beaugrande feels that more is needed for a grammar to exclude all nonstories. However, this really depends on whether the grammar is one that works from the bottom up or is a top-down construction, and whether it deals sufficiently with content as well as with structure. A grammar should not be called a grammar unless it can exclude some text as not falling within the genre of that grammar. Here it is critical to distinguish different levels of abstraction in the categories of a grammar.

Beaugrande says that "the basic inception of story grammars makes it unlikely that they would deal with surprise" (this issue: 3.14). His first reason for this is that the positing of well-formedness as a necessary condition for the members of a category would mean that any violation of expectations such as an event that is not covered by the grammar, would be precluded. But Beaugrande would be the first to say that there *is* an element of surprise in any grammar or transition network in which several possibilities are allowed at some particular juncture point. Thus even though the range of possibilities is restricted the actual choice has a certain element of surprise. In fact the information content at some particular choice point can be calculated in a grammar if there is a finite number of possible choices. This is one of the few social science areas in which a closed system might allow the calculation of information or redundancy if the problems of iteration and recursion can be handled, presumably on the basis of cognitive limits empirically determined.

The second reason that Beaugrande gives joins with the first as I have

answered it. A categorical grammar need not exclude the notion of probability. Grammars do not indicate direct causality unless there are no choices in the system. True, once one has followed an event chain through from beginning to end, he may have the feeling that the process was logically inevitable. However, there are any number of places where a different event chain would have taken place. The fact that one has a sense of logical inevitability or that one feels that this story was predictable means simply that one knows the full range of possibilities encompassed by that grammar, just as when one sees a B movie and feels able to predict all the events that take place. But this feeling of *déjà vu* is always *ex post facto*. If one were actually to stop the film at each juncture point, he may find his predictions to be wrong. One has a sense of successful prediction where he knows that at that particular juncture point there will be one of, say, three possible events, rather than one of an infinite number. When one of those possibilities occurs, the other two are forgotten, hence the sense of a correct prediction. The whole element of surprise which Beaugrande deals with so well is best seen in terms of probabilities. In fact this has already been discussed elsewhere by Beaugrande (Beaugrande and Colby 1979; Beaugrande 1980) where the interactions of characters in a story are seen as mutually influencing and blocking event-state pathways where interest is maintained through the degree of uncertainty about state-event-state chaining.

3.2.

A source of confusion can be clarified by distinguishing between grammars and decision models. In our work with Ixil divination (Colby and Colby 1981) we had to construct a decision model that took the situation of the consulting divination client and matched it with a set of possibilities constrained by the positions of seeds laid out according to the Pre-Colombian Mayan calendar. The diviner uses this system to arrive at a "reading" which identifies the behavior of the sick client which had caused anger in a supernatural being (who, in anger had made the client sick). To duplicate this reading we required a grammar that constrained the form in which stories coming out of the decision model were produced. We had a large and complex decision model with a very simple story grammar hooked to it.

There may be other tasks in which the greater emphasis is on the grammar rather than the decision model. In linguistics an augmented transition network is essentially a grammar with tiny decision models attached to it at various points.

In either case the grammar is used to identify the correct form of the output. The decision model determines its content. Thus a grammar requires as input the story itself. The output is simply a yes or no decision on whether or not the story fits the grammar. The decision mode, on the other hand, does not take the completed story as input. It produces the story with other types of input. In

the production of the story, the decision model refers to the grammar for guidance in a kind of sequential logic. The grammar at the various transition points provides the alternatives to be considered by the decision model. The actual choice made by the decision model requires other types of input.

4. Systemic linguistics and narrative function

The next matter that has been neglected is that of the multiplicity of narrative function. Here it will be helpful to examine the categories postulated by Michael Halliday for his theory of systemic linguistics. Language phenomena are divided by Halliday into three major systems, experiential, interpersonal, and textual. An analysis of a clause requires three sets of categories, each set pertaining to one of the systems. For example in the clause, "the Grays did retire to their beds", Halliday (1977: 178) classifies the various segments according to three different systems (see table 1).

The first system is experiential and involves transitivity categories such as Medium or Agent, Process and Extent. The second is interpersonal, with mood as the predominant category system; and the third is textual, concerning the categories theme, rheme, and given, new. I don't see why the same three systems can't also organize what we look at in stories at a higher level than the clause. It becomes a matter of determining how the higher level systems can be identified and characterized. Systemic linguistics, particularly Halliday's formulation of it, is the only current linguistic theory that can be applied to language from this broader perspective. It is no accident that some of the pioneering work in artificial intelligence (AI) for text comprehension (Winograd 1972) and text generation (Mann and Moore 1980) found Halliday's system the only viable one to use.

Table 1

System	Clause			
	the Grays	did	retire	to their beds
(1)	Medium	Process		Location: locative
(2)	{ Modal Subject	Finite	Propositional	
(3)	Theme	Rheme		

5. Evolution of story forms

Beaugrande speaks of the evolution of a story form as steadily migrating toward a canonical form or ideal pattern if it were not for the need to maintain interest. In Beaugrande and Colby (1979), we discuss how the dynamics of a context of social interaction work against the imposition of a static ideal version of a story. Years ago when Propp (1968) talked about the possibility of his Russian folk tales being, in essence, all one story, he was remarking about the tendency for functions (or, as I have called them, eidons) to follow a long sequence in a normative scheme (with only one alternate path midway through that scheme). Had he further developed his material into an actual grammar Propp would have been less likely to take such a possibility so seriously. We know that evolution is not a teleological process toward some single ideal. There are many niches that different narrative units in an evolutionary scheme can fit into. Just as a species fits some particular niche but has a better chance of surviving a catastrophic change in that niche if there is heterogeneity in its gene pool, so also does a genre of a cultural group have a better chance of surviving if there are many varieties of stories within it. The greater the variety in the possibility of those stories' unfolding the better the chance that the genre will continue.

We should consider that there are conflicting forces that operate on the evolution of a group of stories. Watt's work shows two conflicting tendencies operating in the evolution of the alphabet (1980). One is the requirement that the letters be readily distinguished from each other and thus easily read. The other is that the letters be easily reproduced, which means a minimum of writing or strokes for each letter. These two operate against each other. The dynamic between the two determines the evolution of the alphabetic inventory for a language. There has to be some equilibrium between forces moving towards greater redundancy and towards greater information.

In studying the evolution of story forms the basic requirements of a story have to be kept in mind. This has been usefully mapped out in Beaugrande's paper where informativity, the requirement of at least one intimate agent, and other requirements are discussed (sections 3.5–3.9). Clearly, the settings in which a story is placed always begin with some normal situation. The whole point of a story is that there has to be some departure from the normal. It is the complicating or extra-normal event that gets the story moving. The dynamic between the normal and the unusual maintains the interest of a story. And it is precisely the interest of a story which determines whether or not it is passed on in a long evolutionary sequence.

The transmission and evolution of stories involve microlevel processes. We need experiments to see just what it is that causes stories or elements of stories to be remembered and transmitted and what allows them to be forgotten and to drop out. This matter of interest requires that we focus on such things as

pattern salience in a story. Salient patterns are, by definition, psychologically important. Tversky (1977) defines salience as a mix of intensity and diagnosticity, the former concerns features that increase the signal-to-noise ratio: brightness, loudness, frequency, clarity, saturation (of a color) and vividness. The latter is the discriminability of one object from others with which it is usually grouped. These notions can be among those applied to questions of salience or highlighting in narrative as well.

This ties in with Beaugrande's concept of ecological value, "the grammar's contribution to our knowledge about how stories are told and understood by human beings" (section 3.1). It also ties in with the anthropological function of cultural models. Individuals choose stories because they can provide needed skills in thinking or dealing with the world. They also provide vicarious experience in areas that individuals (perhaps subliminally) feel a strong need to develop expertise. And finally stories can assuage psychological conflicts (Roberts and Sutton-Smith 1962). So part of what selects a story to be transmitted is its behavioral function. We must go beyond the story itself to the behavioral logic that is called upon in story comprehension. Wilensky (this issue) emphasizes this broader domain of analysis because of the kinds of problems he and others encounter in working out models of text comprehension in their computer programs.

In working out programs to deal with text content people in artificial intelligence have had to reinvent ethnography. It is disappointing that more anthropologists have not directed their efforts towards artificial intelligence where the long-term memory component that is so necessary to text comprehension systems amounts essentially to an ethnography. The need to develop a cognitive ethnography that combines the best aspects of anthropology and AI is obvious. Whether this need will be met may depend on how story analysis develops in the near future.

6. Schema and experimentation

Work with the concept of schema is another convergence of interest between anthropology and psychology. Bartlett's original experiments were done with anthropological data. While anthropologists usually are not experimentalists, their concern with identifying underlying cognitive chunkings has brought them to consider recent work in psychology and even to try experiments. For example, recently Rice (1980) has taken traditional folk tales and experimented with their comprehension after deleting key chunks from the stories. Sae gives the schema concept the chief role in her interpretation of the results.

Mandler and Johnson (1977) define a story schema as a set of expectations. These expectations include possibilities that are not actually realized in a particular story as it unfolds. It is this broader set of unrealized possibilities

that constitutes the elements of what might be called a cognitive ethnography. This is the underlying behavioral logic which has to be brought out in any analysis of the story comprehension process.

7. Conclusion

We need both distributional studies and experimentation. We must analyze the patterning to be found in folk tales and experiment with postulated structures of schemata. The two are in continual process as an individual negotiates the external world and his internal mind. This is where cognitive science has real promise as a new interdisciplinary field.

We have reached the point where empirical findings will be needed to settle some of the issues raised in Beaugrande's paper. We are moving out of a stage that, to be sure, has resulted in a great variety of rich and stimulating ideas, into a new stage where these ideas must be tested in the laboratory, or examined empirically in distributional studies. In looking at stories as patterns the primary emphasis is on the distribution and the identification of these patterns. This is primarily an anthropological task. In looking at stories through an experimental mode we shift over to the more strictly cognitive side and consider schemata in what is primarily a psychological task. But the two need each other. From Beaugrande's presentation and the various replies, particularly that of Mandler, it looks as though the study of stories is ready to move into the mainstream of both anthropological and psychological concern.

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Benjamin N. Colby (b. 1931). B.A.: Princeton University; Ph.D. (Social Relations): Harvard University. Professor of Anthropology and Director of the Laboratory of Anthropology, School of Social Sciences, University of California (Irvine). Research interest is in culture theory through text analysis and the study of role structures, belief systems, and social ethics. Currently doing field work with a California Amnesty International group.