

On Evaluating Story Grammars*

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In their recent article entitled "An Evaluation of Story Grammars," Black and Wilensky (1979) offer a critique of the recent work on this topic. They argue that story grammars (or story schemata as I prefer to call them) are not a productive approach to the study of story understanding, and they offer three main lines of argumentation. First, they argue that story grammars are not *formally* adequate in as much as most of them are represented as a set of context free rewrite rules which are known to be inadequate even for sentence grammars. Second, they argue that story grammars are not *empirically* adequate in as much as there are stories which do not seem to follow story grammars and there are nonstories which do. Finally, they argue that story grammars could not form an adequate basis for a comprehension model since in order to apply the grammar you need to have interpreted the story. These arguments are, in my opinion, indicative of a misunderstanding of the enterprise that I and others working on these issues have been engaged in. I believe that they are all based on a misunderstanding about what grammars might be good for and about how comprehension might occur. In this response, I wish to clarify the nature of story schemata as I understand them, clarify the nature of Black and Wilensky's misunderstandings and show how each of their arguments fails to address the important issues about story grammars and story schemata.

I begin by summarizing the basic notions of story grammars and story schemata. Most story grammars are based around the observation that many stories seem to involve a sort of problem solving motif (c.f., Mandler & Johnson, 1977; Rumelhart, 1975; Rumelhart, 1977b; Stein & Glenn, 1979; Thorndyke, 1977). Such stories have roughly the following structure: First, something happens to a protagonist which sets up a goal that must be satisfied. Then the remainder of the story is a description of the protagonist's problem solving behavior in seeking the goal coupled with the results of that behavior. The

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problem solving behavior itself is usually well structured and appears to be of the form expected from such theories of problem solving as the General Problem Solver of Newell and Simon (c.f. Newell & Simon, 1972). In some stories there are several of these problem solving episodes, sometimes with different protagonists in the different episodes. Story grammars are, in essence, various schemes for formalizing this structure. The formalizations have usually (c.f. Mandler & Johnson, 1977; Rumelhart, 1975; Stein & Glenn, 1979; Thorndyke, 1977), but not always (c.f. Rumelhart, 1977b), involved the use of rewrite rules which conveniently, and generatively, capture the relationships among the various pieces of such stories.

The basic theme of the research on story schemata is to look at a story and to identify the goals, subgoals, the various attempts to achieve the goals, and the various methods that have been employed. The various parts of the text are assumed to correspond to an introductory setting, various attempts to achieve the relevant goals, outcomes of these attempts, etc. If these various *constituents* actually are psychologically real, we might expect that such things as attempts to solve subgoals would be less important than attempts to solve higher goals, etc. These constituents are typically named by various concepts from the problem solving literature such as attempt, application, choosing a method, etc. Much of the empirical work on story grammars has been involved with the determination of whether attempts associated with subgoals are less memorable or less often mentioned in summarization than are attempts associated with higher level goals, whether adjacent story parts which "cross constituent boundaries" adhere to each other less well than those within constituents, whether stories whose structure is consistent with the problem solving schemata are better remembered than those which are not so well structured, etc.

I will now turn to Black and Wilensky's specific misunderstandings. The first point of misunderstanding involves the question of what story grammars might be good for. Black and Wilensky appear to endorse the view that a grammar is primarily a device for generating all and only the sentences of a language. That definition of grammar presupposes the view that a language is properly defined as a set of sentences and that a grammar is merely a recursive device for enumerating them. That definition, coming out of the theory of formal languages, has very little to do with why a grammar might be *psychologically* interesting. The psychologically interesting thing about a grammar is that it proposes an analysis of the *constituent structure* of a linguistic unit. There never has been, and probably never will be, a grammar of the English language which will generate all and only the sentences of English. By the same token, there never has been and probably never will be a grammar of stories which generates all and only the population of things called stories. Nevertheless, there are grammars of English (and grammars of stories) that are interesting. They are interesting *because* they tell us what elements "go together" to form higher elements and how one group of elements is related to another, and because they

identify analogous elements in different linguistic units. Black and Wilensky appear to be so caught up in the issues of formal language theory (in which considerations of constituent structure are secondary) that they completely ignore this key issue. Instead they focus on largely technical and, from a psychological perspective, irrelevant issues. For example, they claim that most story grammars are "formally inadequate," because they lack complete self-embedding. Obviously, this cannot be an important criticism, for it is a trivial matter to add any sort of self-embedding to a system specified in a rewrite formalism. I originally employed a rewrite system *because it was so easy to express recursion* in this formalism. I created the "Old Farmer" story to illustrate the importance of recursion. In fact, one of my major objections to the other formalisms for story and event knowledge has been the clumsiness of recursion within them (e.g., recursion cannot be represented in the popular script formalism).

Black and Wilensky's "empirical evaluation" of story grammars consists of merely pointing out that for each posited grammar there are both stories whose constituent structure is not of the problem solving sort and "nonstories" which are interpretable in this way. These findings are quite irrelevant. As I argued above, the real purpose of a grammar is to allow the systematic assignment of constituent structure. Of course, a bit of generality is useful; if a particular grammar lacks generality then it can't be of much use. There certainly must be stories based on organizational schemata other the problem solving schemata embodied in most story grammars. The real question here is whether there are enough stories of the problem solving sort to make them a useful set to analyze. The answer is yes, it *is* rather an easy matter to find stories of this kind. Similarly, it is not surprising that there are texts that we would not wish to call a story, understandable in terms of problem solving schemata. Does this mean that the constituent structures assigned by these sets of rules are somehow incorrect? I don't see how. The relevant criticism here would involve a claim that the constituent structures postulated by these grammars are somehow wrong. Black and Wilensky are totally silent on this issue.

Finally, the section evaluating story grammars as comprehension devices seems remarkably naive about how comprehension might work. The authors have outlined a model of comprehension that is purely syntactic and purely top-down. Black and Wilensky claim that they have postulated such a model because "no detailed model has been developed that describes how a story grammar would be used to understand a story." This is simply false. In point of fact, I have written a good deal about how these problem solving schemata might be employed in the comprehension of stories. In Rumelhart and Ortony (1977) and again in Rumelhart (1977b) I provide a plausible account of the processes involved in story understanding. There may, of course, be criticisms of this model, but surely none of the arguments generated by Black and Wilensky are applicable. The problems of pure top-down processes are well known. Comprehension cannot be a purely top-down, syntactically driven process; it must be an

interactive process (cf. Rumelhart, 1977a), one in which possibilities are suggested both from top-down and from bottom-up. It is difficult to understand why Black and Wilensky suggested their improbable model when there was a much more reasonable one already in the literature.

Had Black and Wilensky understood the story grammar enterprise, they would not have been trapped into such a narrow view of how these problem solving schemata might fit into a general theory of comprehension. They would not have thought that the correct way to look at story schemata is in terms of the formal theory of languages. They would not have been surprised that there were stories of other kinds. They would not have been surprised that there were things other than stories interpretable by problem solving schemata. They would not have been misled into thinking that the learnability proofs of Wexler and Hamburger had something to do with story understanding. They would not have posited such an improbable model of comprehension.

To summarize, Black and Wilensky have simply failed to bring any important considerations to bear on the usefulness of story grammars. They have chosen to evaluate them on irrelevant grounds. Not only did they fail to point out the relevant weaknesses with the story grammar approach; they failed to consider its strengths. They failed to point out that story grammars have been useful in determining relevant portions of a story as a basis for a theory of summarizing, as a generally applicable scheme for analyzing a wide range of stories. Serious evaluation of story schemata is in order. Black and Wilensky have simply not provided it.

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