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The Repetition-Shift Plot Structure: A Cognitive Influence on Selection in the Marketplace of Ideas

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Abstract

Cognitive Science research on how to sequence examples to facilitate learning and memory has implications for how to structure information to facilitate its social distribution. Specifically, repetition among obviously similar items capitalizes on comparison to establish a pattern, enabling a final contrasting item to break the pattern and be interesting. We term this the Repetition-Shift plot structure. It is widespread: it is present in roughly a quarter of current full-page magazine advertisements, and about a third of story jokes and folktales. Results from an experiment show when and for whom jokes with this structure should be more interesting than those without the initial repetition. Thus we document evidence for a cognitive factor for how information is selected in the marketplace of ideas.

Keywords: Sequence learning; marketplace of ideas; plot structure; folktales; advertisements; jokes.

Introduction

Why do we know and tell some stories but not others? Surely there are many and diverse factors influencing selection in the marketplace of ideas, such as that they provide information (Allport & Postman, 1947). People also seem to prefer stories that robustly invoke emotions (Heath, Bell & Sternberg, 2001). To this list we would like to add another factor: how the information is structured. Specifically, we will argue that cognitive science data on sequence learning, both from category learning and schema learning research, implies that some ways of ordering information should focus attention and lead to learning.

Stories for young children provide natural examples of the Repetition-Shift plot structure. In *The Three Little Pigs,* three events follow in close succession. One pig builds a straw house, which a wolf blows down. Another pig builds a stick house, which the wolf also destroys. The third pig builds a brick house, which the wolf cannot topple. The climactic third event is interesting because of what does not happen, and it is the initial events that enable children to understand this. The first two events are highly similar, inviting children to compare them. Comparing them enables children to find their commonalities, and to generate a precise expectation about the third event (that the wolf will destroy the third house). This expectation can then be violated, and therefore make a non-event (e.g., the non-destruction of a house) interesting.

Jokes also provide ready examples of the Repetition-Shift plot structure (cf. Sacks, 1992, in the essay "The dirty joke as a technical object; Temporal and sequential organization"). A common joke form has three people entering a bar, standing at the gates of heaven, sitting in a duck blind, and so forth. For example, there is an old joke about two cabdrivers and a priest who are standing at the gates of heaven. The first cabdriver enters and is richly rewarded, the second cabdriver enters and is also richly rewarded, then the priest enters and receives little. The events and their ordering pose a puzzle for the punch line to resolve: why are cabdrivers favored and priests not? "In your sermons, people slept; in their cabs, people prayed."

There are two key commonalities in the examples just given from children's stories and jokes. First, they use a sequence of similar events to set up an expectation. Second, they have a final, contrasting event used as a payoff. We term this the Repetition-Shift plot structure. It is a general way of structuring information to generate a specific, potentially unusual expectation that can then be violated, making the information memorable.

Experimental and Theoretical Support

Presenting multiple highly similar events might seem wasteful. Yet people are drawn to compare highly similar items that are juxtaposed. And comparing even highly similar items can enable people to notice subtle and interesting structures they have in common, as shown by both the category learning and schema learning literatures.

Category learning research has long argued that people compare examples to generate an understanding of the category of which they are members (classification learning tasks; Nosofsky, Palmeri & Mckinley, 1994). Particularly if learning is unsupervised, the order in which people encounter examples matters, and blocking together members of the same category helps (Clapper & Bower, 1994). There is further evidence that some choices among available category members matter, and that it helps to receive several central members first (Avrahami et al, 1997). This line of research suggests that plot structures presenting multiple similar events in succession should encourage people to

infer a common structure and generate expectations that further examples have the same structure.

Research on schema learning also suggests benefits of comparing similar examples (Elio & Anderson, 1984). Specifically, these studies show that comparing examples leads people to focus on commonalities (Gick & Holyoak, 1983), particularly common relational structure (Gentner, 1983). Although comparing examples that share relational structure is beneficial, most people do not spontaneously compare analogous examples (i.e., examples that share relational structure but not obvious surface commonalities; Loewenstein, Thompson & Gentner, 1999). Most schema abstraction studies examine comparisons between analogies, but nonetheless there are theoretical arguments and data to suggest that comparing highly similar items initially is beneficial.

Gentner and colleagues' research on *progressive alignment* most clearly makes the argument that comparing similar items can generate understandings of structure (Kuehne et al, 2000; Namy & Gentner, 2002). Gentner and Kotovsky (1996) introduced the term *progressive alignment* to capture a generalization of their finding that children comparing examples of a pattern in one dimension (*big-little-big*) subsequently noticed analogies to the same pattern expressed in a different dimension (*dark-light-dark*). Loewenstein and Gentner (2001) showed a similar transfer effect with spatial configurations. Children who saw dog bones hidden in two highly similar dollhouses were better able to find a bone hidden in a third, dissimilar dollhouse than children who only saw one initial dollhouse. The implication from these studies is that comparing highly similar items is a springboard to seeing analogies, rather than a dead end of reinforcing initial understandings.

There is also research supporting the importance of a contrasting event that provides a payoff. Schank (1982) argued that people should attend to expectation violations, and a meta-analysis of experimental research showed that violations of expectations are better remembered than expectation-consistent information (Rojahn and Pettigrew, 1992). Further, the more prominent the expectation, the more likely people are to remember the violation of it (Sakamoto & Love, 2004).

In short, cognitive science research provides support for both aspects of the Repetition-Shift plot structure: an initial series of similar events leads people to attend to their commonalities and generate an expectation about additional similar examples, and deviations from that expectation should bring additional attention and be memorable.

Overview of the Studies

We had two goals in this research. The first was to document the prevalence of the Repetition-Shift plot structure. If the research on learning from sequences of examples holds in natural settings, and these effects influence what information people are interested in, remember, and choose to communicate to others, then the Repetition-Shift plot structure should be common. Accordingly, we present analyses of corpuses of folktales, advertisements and jokes documenting the use of the Repetition-Shift plot structure. These three different kinds of content are all subject to severe selection pressures—each item is at risk of being collectively forgotten. Accordingly, if the Repetition-Shift plot structure is commonly used, this would provide strongly suggestive evidence for its utility. A second goal was to generate experimental evidence as to when and for whom the plot structure should be useful.

Plot Structures in Folktales

Children's stories, such as *The Three Little Pigs* and *The Three Billy Goats Gruff* often seem to use the Repetition-Shift plot structure. Gentner first called attention to this connection by calling the Loewenstein and Gentner (2001) spatial mapping experiment "the Billy Goats Gruff study." Folktales provide an opportunity to examine a broad base of such stories, and allow us to emphasize stories recorded from oral transmission. Oral transmission places stronger demands on comprehension and memory than literary transmission and accordingly orally transmitted stories should be more likely to make use of the Repetition-Shift plot structure (for a broader examination of the cognitive psychology of oral tales, see Rubin, 1995). Thus folktale collections provide an indication of selection pressures over a long history of oral transmission, and hence potentially crucial insight into selection in the marketplace of ideas.

The canonical Western source of folktales is the collection compiled by the Grimm brothers. It includes classic tales such as Rapunzel, Hansel and Gretel, Cinderella, Little Red Riding Hood and Snow White. There are multiple translations available, which allowed us to code three versions (including one claimed to be a poor translation) to ensure that plot structure was not altered across translations. Finally, it is a well-studied collection of folktales, and we have information as to which stories were from oral sources and which were from literary sources. We could even examine some of the folktales that the Grimm brothers omitted from their final edition for further insights.

We took a sample of Grimm folktales and analyzed them for the use of the Repetition-Shift plot structure both as the main plot for the entire story, as well as for just a portion of the plot. We also coded for sheer repetition without a shift (i.e., without a contrasting final event) as a control for the use of repetition alone as a memory aid. In addition, we coded the number of events in each plot structure. It is possible that because the number three has important cultural significance, stories with three events may be prevalent due to cultural resonance, rather than, or in addition to, cognitive reasons. Three is the minimal number of events needed to generate the Repetition-Shift structure.

Methods

Materials We examined 90 Grimm folktales. These fell into three categories derived from Zipes (1987). According to Zipes, 160 of the full set of Grimm folktales were taken from oral traditions, and we randomly selected 43 of these. A further 51 tales were from literary traditions, and we

randomly selected 24 of these. Zipes also records an additional 31 tales that were omitted by the Grimm brothers from their final edition. We randomly selected 23 of these. Some of these were omitted from the final Grimm collection because they were too similar to included folktales (n=9), and the rest were omitted because they were deemed unfit for the final collection (n=14), due to being too gruesome, baroque, allegorical, more a legend than a folktale, insufficiently German, and so forth. Finally, to ensure that the plot structures were inherent to the folktales, we coded the 67 folktales included in the Grimm brothers' final edition in two additional translations, one of which was another well regarded translation (Manheim, 1977) and the other of which was a poorly regarded translation (Barnes & Noble, 1993). Our codings were identical across the three collections.

Coding We coded three aspects of each folktale's plot structure. First, we coded whether the Repetition-Shift structure was the dominant plot for the entire folktale. Second, we coded whether the Repetition-Shift structure accounted for a minor portion of the plot. Third, we coded whether repetition occurred as either a major or minor part of the plot structure. The distinction between the Repetition-Shift plot structure and repetition was whether the last item differed from all the items coming before it substantially more than the initial items differed from each other. Because the latter two codes could apply to a minor part of the plot, the three codes were independent—a given folktale could have received all three. In addition to the presence or absence of these plot structures, coders also recorded the number of events in the plot structure. For example, if a story described three knights fruitlessly attempting to rescue a princess prior to her successful rescue by a shepherd boy, this would have been recorded as an instance of the Repetition-Shift structure as the main plot, composed of 4 events.

One coder rated every folktale. A second coder rated 46. Agreement for the main plot structure was 80%, for minor plot structure was 78%, and for repetition was 72%. Across the three structures, the coders agreed on the number of events, given both agreed that the given kind was present, 83% of the time.

Results and Discussion

Examining the oral and literary folktales included in the final edition, 63% (42/67) used the Repetition-Shift structure to organize a main or minor plot. In contrast, just 21% (14/67) used repetition as a plot structure, a clear difference, $\chi^2 = 24.05$, $p < .001$. Surprisingly, given the prevalence of the Repetition-Shift structure, we contacted half a dozen folklore experts, including a translator of the Grimm collection, and all discussed recurring motifs and repetition, but none had previously abstracted the Repetition-Shift plot structure as a generalization.

If the Repetition-Shift structure and repetition were useful aids to limited attention and processing capacity, then one would expect them to be more common in oral than literary folktales. This prediction held: more folktales with oral origins (38%, 49/129) than literary origins (22%, 16/72) used these plot structures, $\chi^2 = 5.25$, $p < .05$. And just examining the Repetition-Shift plot structure, 74% (32/43) of those with oral origins incorporated the structure, in contrast to 42% (10/24) of those with literary origins, $\chi^2 = 7.06$, $p < .01$.

The Repetition-Shift plot structure requires at least three events—two similar events followed by a contrasting one. Yet the number of initial events can be more than two, and we found folktales with two to five initial events. The structure was more likely to have more than two initial events if it was the main plot structure (43%, 10/23) than a minor plot element (14%, 4/28), $\chi^2 = 5.40$, $p < .05$. Repetition also extended across a broad number of events, from 3 to 12, with many repetitions of more than 3 (43%, 6/14). Thus, although several Grimm folktales state that "all good things come in threes" and three is a culturally important number, repetition and the Repetition-Shift structure are prevalent in more numerous instantiations.

We found additional evidence consistent with an advantage of the Repetition-Shift plot structure in analyzing the two kinds of folktales the Grimm brothers omitted. One set of folktales was omitted for being too similar to included stories. Of these, 78% (7/9) included the structure in some form, and 89% (8/9) of the matching stories that were actually included have the structure. A second set of folktales was omitted for a variety of negative reasons, and just 21% (3/14) use the Repetition-Shift structure, which is reliably less frequently than in the folktales omitted due to redundancy by a Fisher's Exact Test, $p < .05$.

Finally, to generalize beyond the Grimm folktale collection, a parallel analysis was done on a random selection from a culturally diverse sample of folktales: Jane Yolen's (1986) *Folktales from Around the World*. Two results were striking. First, 43% of the sample used the Repetition-Shift structure as their main plot structure. Second, these folktales were from cultures spanning the globe. Taken together, evidence from folktales shows the Repetition-Shift structure is prevalent, consistent with the claim that sequence learning findings indicate how to structure information such that it is more likely to be interesting, remembered, and communicated.

Plot Structures in Advertisements

Folktales were subject to the selection pressures of oral transmission. We turn to a different but also intense arena with respect to selection pressure: modern magazine advertising. An advertisement's effectiveness depends in part on whether potentially distracted people readily find them sufficiently interesting that they spend more than a moment looking at them. Advertisements are also strongly visual. Nonetheless, because the predictions from sequence learning should apply equally well to advertisements as to folktales, we expected to find evidence for the presence of the Repetition-Shift plot structure.

Even a casual examination of advertising indicates the Repetition-Shift structure is used in the domain. For

example, a highly successful advertising campaign from the past 10 years is Mastercard's "priceless" campaign, which uses the Repetition-Shift structure. For example: "18 speed bike: $1235. Shipping bike to Italy: $281. Map of Tuscany: 4000 lira. Seven days without email: priceless." Although the advertising agency that created MasterCard's campaign has generated numerous variations of the above example for multiple media, discussions with members of the firm suggest that they did not identify the ads plot as a general structure.

We examined full-page magazine advertisements because they are common and sufficiently large that they could contain more information than just a brand name, slogan, or logo. We randomly sampled from an online archive of full-page magazine advertisements. We looked for our structure in main words and images only, not in fine print or paragraphs. We also coded for rhetorical tricolon as a control for cultural preference for the number three and for rhetorical nicety. Tricolon is repetition in threes, such as "better, faster, stronger." Tricolon does not require a "shift" at the end, only applies to words, and only applies to sets of three items.

Methods

Materials We examined 80 full-page advertisements originally published 1990-2003. We randomly selected advertisements from Adflip.Com's online database. We generated one sample of 40 advertisements drawing from their entire database, and a second sample just from automobile advertisements to ensure that any results were not due to either a particular industry or to the nature of the non-representative Adflip.com sample itself. As results were similar across both sets, we combine them for our discussion here.

Coding We coded for the Repetition-Shift plot structure as well as tricolon. We only coded for these in the primary text and, for the Repetition-Shift structure, main images in the advertisement. We ignored any text in paragraphs. Two coders rated all the advertisements, and agreed on 89%.

Results and Discussion

A quarter (25%, 20/80) of the sample of full-page magazine advertisements 1990-2003 used the Repetition-Shift plot structure as their main structure. Tricolon was not as common: 11% (9/80) of the advertisements used it. This is a reliably lower proportion than for the Repetition-Shift structure, $\chi^2 = 5.10, p < .05$.

Examining the advertisements with the structure showed it was instantiated with considerable variation. For some, the structure was solely in the words, for others it was solely in the images, and for some, the words and images together conveyed the structure. The most common form of purely visual use was to have one contrasting item among a set of highly similar items, such as a convertible automobile in a row of deck chairs by a pool or a running shoe among a set of hiking boots. The number of items in the structure varied considerably, from the minimum of 3 to 23. The greatest number used with text was 11; the higher numbers came from visual uses.

The examination of advertisements showed that the structure is in widespread and varied use. Our numbers imply—and casual testing supports—that on average, one may expect the typical magazine to have a couple advertisements using the Repetition-Shift structure.

Plot Structures in Jokes

A third arena for examining plot structures in information under selection pressure is jokes. If jokes are not funny, they do not persist. As humor relies at least in part on novelty and surprise, a structure that can convey a novel pattern and direct attention (if only to allow misdirection) should be valuable. The structure should also facilitate a joke's being remembered and retold, thereby aiding its transmission and diffusion. We hypothesized the Repetition-Shift plot structure fulfilled these demands.

As with advertisements, there is reason to think jokes use the Repetition-Shift structure. There are standard joke forms that use it—such as "three guys walk into a bar…" or "a priest, a minister and a rabbi are standing at the gates of heaven…" In these jokes, the first two characters set a pattern for the third to break. There is a further reason to think that these may not be isolated examples. Comedians have a phrase, "the law of threes" that refers to many things, but at least one of its meanings seems to overlap with the Repetition-Shift structure. It has been summarized as "setup, setup, punchline." Comedians are the one group thus far that we have surveyed who already seemed to know about the Repetition-Shift structure.

To examine whether the Repetition-Shift structure is prevalent, we gathered a sample of jokes from Jokes.Com, a database run by Comedy Central, and the self-proclaimed largest joke site on the web. In addition, because the website allows people to rate the jokes on a scale from 1 to 5, and lists their average ratings, we can test whether the proportion of jokes with the structure increases by rating level.

Methods

We downloaded 197 jokes and their mean ratings by website visitors from Jokes.Com. We constrained our search to story jokes, as opposed to puns, satires, one-liners, top ten lists, and so forth. Although jokes were categorized into standard topics (lawyers, bars, offices, politics, and so forth), we drew from the miscellaneous category so as not to be constrained to a particular content area. Finally, we limited ourselves to clean jokes. We took an initial sample (n=174) of all available such jokes, then supplemented it with additional jokes just at the low and high ends of the rating scale, although even so we had low numbers at both ends. One rater coded all 197 jokes. Two additional coders also rated the initial sample of 174 jokes for use of the Repetition-Shift plot structure, with reasonable agreement with the initial coder ($\alpha = .79$).

Results and Discussion

We found that 36% (70/197) of the jokes used the Repetition-Shift structure. As seen in Figure 1, the proportion of jokes with the structure generally increased with their mean Jokes.Com rating. These ratings ranged from 1 ("blows") to 5 ("hysterical"), and mean ratings were given in 0.5 increments. Because of low sample size at the tails, we collapsed the bottom three ratings categories (1, 1.5, 2), and subsequent pairs of categories (2.5 and 3; 3.5 and 4, 4.5 and 5) to generate a statistical test for the association, which proved reliable, $\chi^2(3) = 9.55$, $p < .05$. Thus not only was the Repetition-Shift structure used, it was more likely to be used in funnier jokes (at least according to the people visiting the Jokes.Com website).

There was another intriguing aspect of the sample. There were 14 pairs of jokes that were essentially alternative versions of the same joke, and 9 (64%) of these pairs used the Repetition-Shift structure. This is consistent with the claim that the Repetition-Shift structure aids selection in the marketplace of ideas. It is also reminiscent of the finding of substantial use of the structure in the folktales the Grimm brothers omitted due to repetition.

As with the folktales, we conducted a parallel analysis using an alternative sample. We drew 60 jokes from Milton Berle's (1989) collection of over 10,000 jokes. These jokes can be roughly characterized as one-liners and story jokes based on length. We simply ignored the one-liners and randomly drew a sample of longer jokes (i.e., those at least 6 lines long). We found that 30% (18/60) used the Repetition-Shift structure, confirming the prevalence of the structure within samples of story jokes.

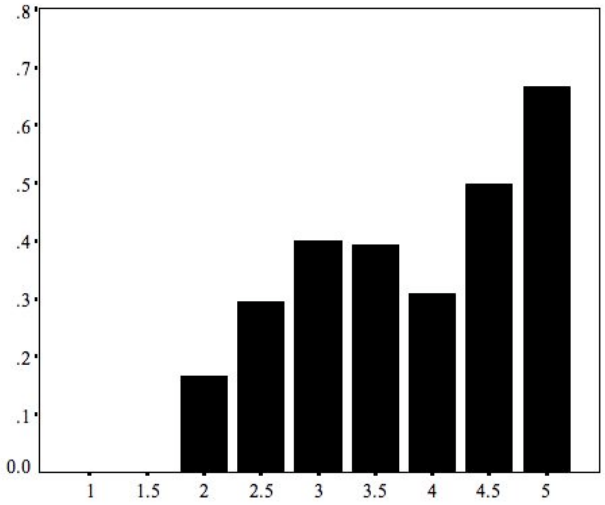

Figure 1: The proportion of jokes using the Repetition-Shift plot structure by average Jokes.Com rating.

Experimental Manipulation of Plot Structures

Given the substantial prevalence of the Repetition-Shift structure in three different domains, we now turn to an experimental test of it. We were interested in examining not just whether alterations to the structure would be harmful, but also for whom and under what circumstances. We will present some data from a larger study, focusing here on jokes taken from the Jokes.Com sample just discussed.

To set up our predictions, we will draw an analogy to Bowdle and Gentner's (2005) *career of metaphor* hypothesis. They argued that metaphors are initially processed as comparisons (a billboard is like a wart), but as they become conventional, they are processed as category inclusion statements (encyclopedias are goldmines, where goldmine has a conventional categorical meaning of "a source of value"). We suggest that the efficacy of the Repetition-Shift plot structure should be similar. People should need to draw comparisons across repeated events to set up an expectation if they are unfamiliar with the common structure in the events. However, jokes with conventional themes (e.g., greedy lawyers, dumb blondes) should not require initial comparison, as one example should be sufficient to invoke the expectation. Thus we have three predictions. First, people unfamiliar with particular joke types should find jokes with the Repetition-Shift structure more interesting, funny, surprising, and so forth than jokes lacking the initial repetition. Second, people familiar with the joke types should not show a preference for jokes with initial repetition. Third, conventionality should reduce people's ratings of jokes: people familiar with the joke types should rate them as less funny and interesting overall than those unfamiliar with the joke types.

Methods

Participants A group of 40 university students participated for a payment. Included in this total are a sub-sample of non-native language speakers (n=14) who served as a population that should have been unfamiliar with the joke themes.

Materials We used a subset of the Jokes.Com jokes from the previous corpus analysis. We selected jokes from which we could easily remove the initial repetition in the setup. The jokes were otherwise unchanged.

Procedure People read 36 jokes, half with and half without the Repetition-Shift structure. The first two jokes did not vary, but across subjects the remaining items were presented with and without initial repetition. The key measure was the overall rating of jokes with the structure compared to those without. The ratings were an average of people's responses to four questions about each joke (on a scale from 1 "not at all" to 7 "very"; $\alpha = .94$): how interesting it was, how likely they would be to show it to a friend sitting nearby, how surprising it was, and how funny it was.

Results and Discussion

As shown in Figure 2, the results confirmed our three hypotheses. Non-Native English speakers preferred jokes with the Repetition-Shift structure to those without the initial repetition, 4.67 versus 4.15, $t(13) = 2.23$, $p < .05$. Native speakers found the jokes far less interesting (3.29 versus the non-natives' mean rating of 4.41), $t(38) = 3.25$, $p < .005$, and did not show a preference for the Repetition-

Shift structure (3.28 versus 3.30). The implications of these results are that the Repetition-Shift plot structure is useful primarily to establish expectations for novel patterns. Familiarity removes the need for the initial repetition.

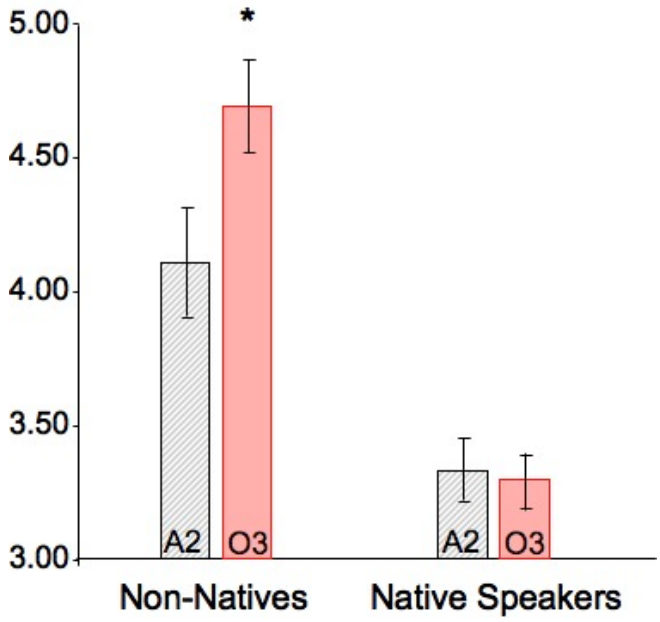

Figure 2: Average joke ratings for jokes using the Repetition-Shift structure (O3) and those with initial repetition removed (A2) for Non-Native and Native English speakers.

Conclusion

Cognitive Science research on learning yields insights not only into what individuals know, but into what groups and cultures know. Research on category and schema learning suggested a plot structure that could be interesting, easily understood, and well remembered. We found it to be prevalent in samples of folktales, advertisements and jokes. Further, initial experimentation was consistent with extensions of theorizing, as we found that the structure was particularly helpful to people unfamiliar with the content, and people who were familiar but distracted. The implication of this work is that Cognitive Science provides a basis for explaining how to structure information to increase the likelihood that people will acquire and transmit it. The Repetition-Shift plot structure appears to be a cognitive influence on selection in the marketplace of ideas.

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