

Cognitive responses to (linguistic) topic change in discourse

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Imagine the following scenario: I am at a conference having a conversation with one of my colleagues. We are discussing some of the papers we heard during the day's meeting. In the middle of this discussion, I nonchalantly mention: "Watermelons grow well in the South." This utterance would lead to several consequences. With the exception of my colleague concluding that I was a bit odd, most of these consequences would be at his or her expense.

Subjectively, the feeling one has when the discourse topic changes abruptly is something like a mental double-take. We stop for a puzzled moment. Mentally we question the speaker or author: Wait a minute, weren't you just talking about Cognitive Science? What in the world does that have to do with watermelons? However, this overt response occurs only to the most blatant topic changes. Those that occur in natural discourse are much more subtle. I suggest that what occurs there is a covert response, a cognitive Processing Shift.

The notion of processing shifts is drawn from a framework recently sketched (Gernsbacher, 1984). According to this framework, the goal of comprehension is to build up a coherent mental representation of the complete stimulus and this representation is built in the following way. During comprehension memory "cells" are activated by incoming information. (Memory cells contain previously stored mental representations or traces). Initial activation of memory cells and their transmission of processing information (enhancement and suppression) lays a foundation. Once laid, congruent (similar or related) stimulus information simply adds on to the developing structure. This is because the more overlapping the incoming information is with that previously received, the more likely it will be to activate the same or connected cells. However, the less congruent the incoming information is, the less likely it will be to activate the same or connected cells; hence, the less likely it will be to build on to the developing structure. In this case, a different set of cells will be activated. Because this second set of cells has not been recently activated, a relatively new foundation begins to be laid. This shift from actively building one structure, really a sub-structure, to initiating another is a processing shift.

Presumably processing shifts should be manifested in cognitive behavior. Likely consequences are that processing shifts consume attention, retard integration, and reduce memorial retention (at least of the pre-topic change material). There is some evidence to substantiate each of these assumed responses. But this evidence has been collected from comprehension situations where the topic changes are of the gross semantic type -- similar to my introductory example. I was interested in whether indeed we are also sensitive to more subtle indicants of topic change. In particular, I wanted to know what cognitive responses might result from processing linguistic devices that signal topic change. Three such devices are: Renormalization, Object-Subject Conversion, and Adverbial Leads. These devices are best described by example; moreover, illustrating them will give me a chance to explain some of the study's methodological nuts and bolts.

I constructed several pairs of seven-sentence paragraphs. Each pair differed only by their fourth and fifth sentence. In one member of a pair, the linguistic device appeared in the fourth sentence, while in its mate paragraph, the device appeared in the fifth sentence. I will refer to these members of a pair as versions A and B, respectively. So, for example, a pair of paragraphs using Renormalization began with these three sentences: (1) *Joe was studying hard for his math test.*

(2) *He had read two chapters in the book.* (3) *He was now trying to work the problems.* In version A, the fourth sentence restated the main character's name; (4A) *Joe could tell he would be up all night.* In version B, this renormalization did not occur in the fourth sentence; (4B) *He could tell he would be up all night.* Rather, it occurred in the fifth sentence: (5B) *Joe knew he should have begun earlier.* In contrast, the fifth sentence of version A resumed pronominalization; (5A) *He knew he should have begun earlier.* Both pairs ended identically; (6) *But earlier he had a big softball game.* (7) *And he much preferred softball to math.*

A pair of paragraphs using Object-Subject conversion began with these three sentences: (1) *One afternoon Beth was feeling bored.* (2) *She was tired of watching television.* (3) *She picked up the phone and called Jack.* Then, in version A, the object of the previous sentence was converted to the subject; (4A) *Jack asked her what she had been doing.* In version B, it was not; (4B) *She asked Jack what he had been doing.* Rather, the object-subject conversion appeared in the fifth sentence: (5B) *Jack really didn't have much to say.* The fifth sentence in version A maintained the conversion: (5A) *He really didn't have too much to say.* And again the two pairs ended identically; (6) *He just told her about his boring day.* (7) *All he'd been doing was watching T.V.*

Finally, a pair of paragraphs using an Adverbial Lead began with these three sentences: (1) *The man was sitting on his front porch.* (2) *He was alone and reading a newspaper.* (3) *He was enjoying the peace and quiet.* The fourth sentence of version A began with an adverb: (4A) *Suddenly, he heard someone call his name.* In version B, it did not: (4B) *He heard someone start calling out his name.* Rather, the adverb fronting occurred in the fifth sentence: (5B) *Suddenly, he ran inside to find out why.* And again, the two versions ended identically: (6) *He found his wife trying to open a jar.* (7) *It appeared that she needed his help.* (Note also that despite these manipulations, the critical fourth and fifth sentences always contained approximately the same number of characters in the A or B version).

In each of these pairs, comparing the cognitive responses occurring after the critical fourth vs. fifth sentences should indicate whether the manipulated linguistic device effected a processing shift (presuming that processing shifts are indeed manifested into cognitive behaviors). In a first experiment, I looked at what might be considered attentional or integrative responses. Subjects were presented with these paragraphs to read line-by-line. Their self-paced reading times were recorded. Presumably, the more attention demanding or difficult the integration process, the longer the reading time. In a second experiment, a more direct measure of attentional capacity was taken: while subjects were comprehending these paragraphs they simultaneously monitored for a stimulus external to the sentences (a probe). Presumably, the more attention consumed, the slower the response to the probe. In a third experiment, memorial availability was observed. Immediately after comprehending the fourth or fifth sentence, subjects were asked to make a speeded judgment as to whether a test sentence was identical to a previously presented one. Presumably, the less available a memory representation, the slower and less accurate the judgment.

There were several possibilities. First, it was possible that we are only sensitive to one or two of these linguistic coding devices. Second, perhaps only one or two of the investigated cognitive responses are manifestations of the proposed processing shifts. Third and least optimistic, it could be that none of the linguistic coding devices noticeably lead to any of the cognitive responses, at least as I operationalized all these concepts. Now, speaking of watermelons ...