Abstract
Some humorous texts can be detected by stereotyped patterns and terminology. But a humorous story or situation is often an exaggeration of patterns that also occur in serious texts: novelty, unusual plot twists, and situations that disrupt normal social conventions. The same methods for detecting patterns in serious texts can be adapted to detecting patterns in a humorous situation, but with additional tests for features that make it humorous. To interpret and reason about natural language texts, VivoMind Research has developed a cognitive architecture based on societies of heterogeneous intercommunicating agents that use conceptual graphs (CGs) as the knowledge representation. CGs are designed for representing semantics at the level of sentences and paragraphs, but they must be related to larger patterns that span an entire story, article, or book. For detecting and analyzing large-scale patterns, catastrophe theoretical semantics has proved to be surprisingly effective. This article discusses applications to both fictional and nonfictional documents of various kinds, both serious and humorous.

Catastrophe Theoretical Semantics
René Thom was a mathematician who developed catastrophe theory and applied it to a variety of physical phenomena. As he broadened the range of applications, he discovered psychological and linguistic phenomena that displayed related patterns. He used the dependency grammar developed by Lucien Tesnière (1959) to represent patterns of events. When he analyzed the dynamic evolution of those events and their consequences, he discovered that they fell into patterns that resembled the chaotic patterns he observed in physics (Thom 1988). He showed that those patterns could be used to classify the typical kinds of plot structures found in literature.

Thom’s ideas were developed further by Petitot (2011) and Wildgen (1994, 2010). Most linguists ignored those developments because they use mathematical computations that are unrelated to the usual linguistic theories. But Tesnière’s dependency structures have a direct mapping to conceptual graphs (Sowa 2008). The methods by Thom, Petitot, and Wildgen can be adapted to CGs.

Applications
VivoMind software has mostly been applied to nonfictional documents on subjects such as oil and gas exploration or rare earth magnetic materials (Majumdar et al., 2008, 2009). For those purposes, catastrophe theoretical semantics has proved to be valuable for classifying document types. It can distinguish documents that serve different purposes, even though they have similar vocabulary and ontology. Examples include chapters from a textbook, research reports, tutorials, and surveys on the same subject. It can even distinguish routine or incremental research from novel papers and highly innovative speculation.

To illustrate the differences between a serious and a humorous text, we used the methods to compare the patterns of betrayal in two anecdotes: the BRUTUS story betrayal model (Bringsjord & Ferrucci 2000) and a joke called “Meeting St. Peter.” In both of them, the situation is painful for the victim. But the victim in the serious anecdote is a sympathetic character (a student); in the other, the victim is a stereotypical butt of humor (a salesman).

Appendix: Two Stories of Betrayal
Following are copies of the two stories that were analyzed by the methods of catastrophe theoretical semantics.

“Betrayal” by BRUTUS
Dave Striver loved the university. He loved its ivy-covered clocktowers, its ancient and sturdy brick, and its sun-splashed verdant greens and eager youth. He also loved the fact that the university is free of the stark unforgiving trials of the business world – only this isn’t a fact: academia has
its own tests, and some are as merciless as any in the marketplace. A prime example is the dissertation defense: to earn the PhD, to become a doctor, one must pass an oral examination on one’s dissertation. This was a test Professor Edward Hart enjoyed giving.

Dave wanted desperately to be a doctor. But he needed the signatures of three people on the first page of his dissertation, the priceless inscriptions which, together, would certify that he had passed his defense. One of the signatures had to come from Professor Hart, and Hart had often said – to others and to himself – that he was honored to help Dave secure his well-earned dream.

Well before the defense, Striver gave Hart a penultimate copy of his thesis. Hart read it and told Dave that it was absolutely first-rate, and that he would gladly sign it at the defense. They even shook hands in Hart's book-lined office. Dave noticed that Hart's eyes were bright and trustful, and his bearing paternal.

At the defense, Dave thought that he eloquently summarized chapter three of his dissertation. There were two questions, one from Professor Rodman and one from Dr. Teer; Dave answered both, apparently to everyone's satisfaction. There were no further objections.

Professor Rodman signed. He slid the tome to Teer; she too signed, and then slid it in front of Hart. Hart didn't move.

"Ed?" Rodman said.
Hart still sat motionless. Dave felt slightly dizzy.
"Edward, are you going to sign?"

Later, Hart sat alone in his office, in his big leather chair, saddened by Dave’s failure. He tried to think of ways he could help Dave achieve his dream.

Meeting St. Peter
A computer salesman died and went to meet St. Peter at the Pearly Gates.

St. Peter: Welcome to our reception hall. We’ve made some updates to our traditional procedures in order to speed up the process and make our guests feel more comfortable. Instead of the old book of sins, we now use an iPad.

Computer Salesman: That sounds great. I love the new technology.

Then St. Peter swiped the iPad and projected scenes from the salesman’s life on the wall next to the Pearly Gates. The salesman began to squirm when he saw some of the long-forgotten events.

St. P: Relax. We got rid of the old trial because it takes too long. We developed new methods that predict the same results with six-sigma reliability. We just let people choose whether they would prefer to go to Heaven or Hell.

Then he took another swipe at the iPad and showed some scenes from Heaven. People in white robes were sitting on clouds, playing harps, and singing hymns.

C S: That looks boring.
Then St. Peter took another swipe at the iPad and showed scenes from Hell.

A toga party was going on. There was wild music, dancing, drinking, and carousing. Men and women in various stages of undress were engaged in every activity imaginable.

C S: That’s fantastic. I choose Hell.
St. P: Done.

St. Peter took another swipe at his iPad, a trap door opened, and the salesman found himself sliding down a steel chute. He was rapidly accelerating down a well-worn path, polished by many previous travelers.

Finally, he flew through an open door into a huge cavern with fire and brimstone stinging his eyes. At once, a dozen little devils with pitchforks started prodding and pushing him toward a fiery pit.

C S: Hey, wait a minute! What happened to the party?
Then the chief devil walked over, stroking his beard.

Chief Devil: Ooooh. You must have seen our demo.

References