

Monica A. Riordan and Roger J. Kreuz  
Department of Psychology  
University of Memphis, Memphis, Tennessee

## Introduction

Lexical factors have been proposed to play a role in identification of written irony:  
Roberts and Kreuz (1994) report that two major goals of irony are to show negative emotion and to clarify.  
Utsumi (2000) suggested that lexical factors such as adverbs and interjections act as cues that help a listener recognize irony by implicitly displaying a negative attitude.  
Kreuz and Caucci (2007), in an analysis of sarcasm in published works, found that interjections signal ironic intent.  
Kreuz and Caucci (2009) found that the presence of adverbs, question marks, and exclamation points made people more likely to perceive a statement as sarcastic than literal.  
Based on these findings, we might expect to find that ironic statements may have more negative emotion words, more certainty words, and more interjections overall than literal statements, with no difference in amount of adverbs, exclamation points, or question marks.

## Experiment 1

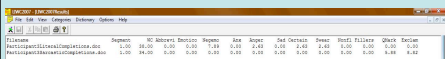
**PARTICIPANTS**  
In Riordan (2008), 76 participants at a large urban Southern university were presented with a series of written scenarios in which a positive prediction is followed by a negative outcome, a situation considered most ironic (Kreuz & Link, 2002). Participants were asked to write the first response that came to mind as if they were the speaker in the situation (see Example 1). These responses were classified as ironic if they were contrary to fact. A subset of the completions were classified by two judges, who established a high level of reliability using Cohen's kappa ( $\kappa = .84$ ).

**METHOD**  
We repurposed these data by creating two text files for each of the participants: one file for all ironic responses given by that participant and another file for an equal number of literal responses given by the same participant. These 152 files were then entered into the LIWC2007 computer program (Pennebaker, Chung, Ireland, Gonzales, & Booth, 2007). LIWC2007 compares these text files against an internal dictionary made of several categories, such as "adverbs" and "punctuation." The program has 80 different categories, but only 11 of these were examined for this study. The examined categories include: word count, words per sentence, adverbs, negative emotion words, swear words, anger words, certainty words, anxiety words, sadness words, question marks, and exclamation points.

Because LIWC2007 has no internal dictionary of interjections, a custom dictionary was prepared using the 161 words and phrases marked as interjections in the Merriam-Webster Collegiate Dictionary, 11<sup>th</sup> edition (Merriam-Webster, Inc., 2003).

We used LIWC2007 to examine each of the 152 text files and returned numbers that reflect the percentage of words in the file that fit into a given category (see Figure 1).

Figure 1: Example of LIWC2007 Output File

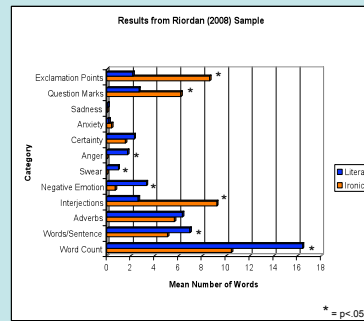


Category	Count	%
Adverbs	10	0.00
Anger	10	0.00
Anxiety	10	0.00
Certainty	10	0.00
Exclamation Points	10	0.00
Interjections	10	0.00
Question Marks	10	0.00
Swear Words	10	0.00
Words/Sentences	10	0.00
Word Count	10	0.00

### Example 1: Scenario from Riordan (2008)

You walk into class and take a seat.  
Another student takes a seat near you and says, "I read over the assignment pretty carefully, and I'll bet this is going to be a great lecture."  
The professor proceeds to give a dry and boring presentation of the material.  
As you get up to leave the classroom, you say to the student:  
<four lines for participants' responses>  
**Examples of sarcastic completions:**  
Yeah, that was great! Can't wait for our next class!  
You sure were right about the lecture.  
Woo, that was so exciting I think I wet myself.  
So you read the assignment pretty carefully, huh?  
**Examples of literal completions:**  
Are you sure you read the right assignment?  
This professor can make even a great lecture sound boring.  
That lecture was horrible.  
I wish I had taken your bet!

## Results



## Conclusions

These results suggest that lexical factors can be used to identify ironic statements. However, because Dress, Kreuz, Link, and Caucci (2008) found regional differences in irony use, these results may not generalize. Experiment 2 was conducted to address concerns about generalizing the study results.

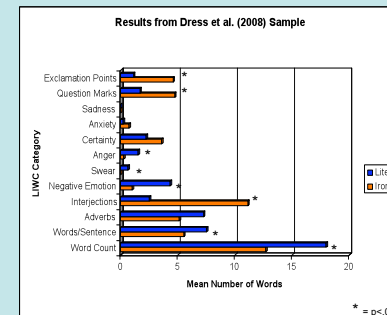
## Experiment 2

Dress, Kreuz, Link, and Caucci (2008) had given scenarios similar to those used in Riordan (2008) to 53 students at a midsize Northern university (see Example 2). These completions were reexamined and classified as ironic or literal by the same person who coded for Experiment 1 and according to the same criteria used in Riordan (2008). These responses were then entered into LIWC2007 in the same manner as in Experiment 1.

### Example 2: Scenario from Dress et al. (2008)

Bill and Ann had decided to go bowling. "I'm feeling pretty lucky tonight," said Bill.  
A few minutes later, they began their game, and Bill threw several gutter balls in a row.  
As Bill returned to his seat, Ann called over to him:  
<two lines for the participants' responses>  
**Examples of sarcastic completions:**  
Yeah, you're lucky tonight!  
What a great roll!  
You're an amazing bowler.  
You feel lucky, huh?  
**Examples of literal completions:**  
Better luck next time.  
You just need to warm up a little.  
I thought you were feeling lucky.  
Did you forget to wear your lucky underwear?

## Results



## Conclusions

The pattern of results for Experiment 1 was duplicated exactly in Experiment 2. Since these corpora represent two different regions of the country, we assert that our results can be generalized to the American population.

## Discussion

These results suggest that lexical factors can be used to identify ironic statements. The nonsignificant results for the adverb category might be attributed to the relatively small internal dictionary for adverbs used by LIWC2007, which contains only 69 words. The significant word count and words per sentence differences echo Fainzilber and Ortony's (1987) compactness hypothesis with regards to metaphor: perhaps ironic statements can express ideas more economically than literal statements.  
This study joins others such as Utsumi (2000), Kreuz and Roberts (1995), and Kreuz and Caucci (2007) in suggesting that irony may not be entirely a pragmatic phenomenon. Pennebaker and Graybeal (2001) asserted that LIWC may be too crude to capture irony, but these results suggest their view may be too pessimistic: it may well be possible to identify ironic language using only lexical items and punctuation.

## References

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