

Humor appreciation and latency of comprehension

WILLIAM A. CUNNINGHAM and PETER DERKS

Abstract

The relation between humor appreciation and comprehension difficulty has been described as an inverted U function. That is, when a joke is too easy or too hard to understand it will be less funny than a joke of intermediate difficulty. Humor appreciation might, however, be a kind of expert skill. Then the easier it is to get a joke for the experienced language user the funnier the joke will be. Two experiments found the relation between the latency of recognizing a message as a joke and the funniness of that joke to be primarily negative and linear. There was no evidence of an inverted U with this material. Funnier material was reacted to more quickly than less funny material providing some evidence for the expert skill hypothesis. Some jokes congruent with male gender stereotypes, however, resulted in higher humor ratings by females but did not affect recognition latency. This finding suggests the possibility of an implicit structural and a more explicit content factor in humor appreciation.

Keywords: Incongruity; expertise; funniness.

A fundamental hypothesis of both aesthetics and humor is the inverted U (negative quadratic) relationship between complexity and preference. A very simple stimulus is boring. A very complicated stimulus is confusing. Between these extremes a somewhat challenging stimulus results in more appreciation and enjoyment. To be preferred, comprehension requires some, but not too much, thought (Apter 1982; Berlyne 1971). Wyer and Collins (1992) have adopted this premise as a central postulate in their theory of humor elicitation.

On the other hand, the “sheer frequency effect” suggests familiarity as an important part of aesthetic enjoyment (Martindale et al. 1988; Zajonc 1968). As for humor, Derks et al. (1998) and Raskin (1998) have proposed that humor appreciation requires expert, sophisticated knowledge of language and multiple meanings. Therefore, relevance and experience can make a humorous message more accessible and, therefore, more enjoyable. Thus the process of humor appreciation reflects general information processing principles (Mahony 1999). If humor appreciation is a more automatic, expert skill then the relation between comprehension and funniness should be linear, not necessarily an inverted U. The more automatically accessible the humorous style and content the more amusing will be the message.

Evidence supporting the inverted U primarily comes from two sources. The studies either used children as participants (McGhee 1976; Zigler et al. 1967) or contrived stimuli (Hoppe 1976; Wilson 1979; Wyer and Collins 1992). In either case, familiarity and expertise with language abstraction and ambiguity were minimized. The tasks were more closely related to novel problem solving without relevant skill and acquired expertise as factors. In studies of humor appreciation using adults evaluating real jokes, comprehension difficulty is negatively correlated with amusement and a negative quadratic component is not found (Derks et al. 1998; Graesser et al. 1989; Wicker et al. 1981). Moreover, Herzog and his associates reported that joke body to punch line fit and surprise correlates with joke preference, also with no evidence of the inverted U, quadratic component (Herzog and Bush 1994; Herzog and Hager 1995; Herzog and Karafa 1998).

1. Experiment I

The present study compared a more direct measure of comprehension difficulty, the time required to see that a message is a joke, with the appreciation of that joke. Presumably complexity should be directly associated with recognition latency. The harder it is to discover the joke, the longer it will take. Holmes (1969) found that speed of response and humor preference differentiated males high in psychopathic deviance from other males. The “psychopathic” participants responded more quickly to sexual and hostile humor and showed a significant preference for it. Linear and quadratic components of the relation were not examined, but the

measures did appear to “hold promise for future research” (296). Even though McGhee (1999) has made a similar suggestion even more recently, the reaction time measure has been employed only incidentally (Goel and Dolan 2001; Mobbs et al. 2003).

If amusement and complexity are related as an inverted U, then more easily and quickly recognized jokes should get lower ratings on funniness. In fact, it could be that jokes will be recognized more slowly than non-jokes because of the “time to find the alternative schema into which the punch line can be assimilated” (Deckers 1998: 324). In contrast, Kreiner (1995) found jokes to be recognized faster than non-jokes. Indeed, the expert skill hypothesis predicts that jokes will be recognized more quickly than non-jokes and as latency increases funniness will decrease.

2. Method

2.1. Participants

Fifty-four students in introductory psychology served in this experiment to fulfill a course requirement.

2.2. Materials

Seventy-two stories were presented in different random orders. They were selected from those used by Derks et al. (1997) and Kreiner (1995) to have short, usually one word, “punch line” resolutions. Forty-eight were presented as jokes and 24 were modified to be meaningful and not funny. Only the “punch” was changed so the jokes could not be discriminated from the non-jokes until the very end.

2.3. Procedure

IBM compatible computers were programmed to present the stimuli and record responses. The participant pressed the space bar and the body of the joke or message was presented on the computer screen. When the material was read, the participant pressed the space bar again and the final word or brief phrase was presented. The participant responded as quickly

as possible to indicate, with different keys, whether the message was a joke or not. Then the participant rated the funniness of the message using the numbers “0” to “9” on the keyboard. The “0” meant not funny at all and not a joke, while greater than “0” meant some degree of funniness with “1” barely funny to “9” as one of the funniest ever seen. The remaining seven numbers were scaled accordingly. All times between presses were recorded but the latency from the presentation of the final word or phrase to the decision that the message was or was not a joke was the measure of comprehension latency or “RT.”

3. Results

3.1. *Jokes vs. non-jokes*

Jokes were recognized as jokes 80% of the time and non-jokes were called jokes on 35% of their presentations. The jokes received an average funniness rating of 3.68 to 2.00 for non-jokes, $t(70) = 9.20$, $p < .0001$. Thus the jokes were clearly discriminated from the non-jokes.

As examples, the two funniest jokes (with “/” indicating the pause before the punch phrase) were:

The angry wife met her husband at the door.
There was alcohol on his breath and lipstick on his collar.
“I assume,” she snarled, “that there is a very good reason for you to come waltzing in at five o’clock in the morning!”
“There is,” he replied, /
“Breakfast.”

And:

I know a couple who found a plan that works.
Three nights a week he goes out with the boys.
The other four /
she does.

Both received average ratings of 5.0.

There were also funny messages that were intended as non-jokes. The funniest was:

While reading the newspaper, Morty came across an article about a beautiful actress marrying a football player not noted for his IQ.

“I’ll never understand,” he said to his wife, “why the biggest jerks get the most attractive wives.” His wife replied, “Why/you’re right.”

The rating was 3.78 and it was called a joke 80% of the time. The meaningful punch line was a close approximation of the original, “thank you.”

3.2. *Response latency and funniness rating*

Figure 1 presents the distribution of ratings (FUN) by comprehension latency in seconds (RT) for all jokes and non-jokes. Jokes were judged more quickly than non-jokes, 4.30 to 4.99 sec, $t(70) = 2.36$, $p < .021$, replicating Kreiner (1995). The latency of recognition was negatively correlated with appreciation, $r(70) = -.43$ and the best fit function between FUN and RT was $FUN = 4.86 - 0.39 RT$, $F(1, 70) = 15.36$, both $ps < .0001$. Figure 1 shows this best fit function. The quadratic component, calculated using the square of the recognition latencies, was not significant and did not support an inverted U function.

This relationship could be a result of non-jokes requiring more processing than jokes. It might take longer to differentiate the subtle difference between non-jokes and bad jokes and result in a longer delay for low rated humor. Therefore, jokes and non-jokes were examined separately to evaluate the generality of these results. For jokes alone; $FUN = 5.23 - 0.36 RT$, $F(1, 46) = 21.74$, $p < .0001$ for the linear component and, again, non-significant for the quadratic. Non-jokes showed a flatter and insignificant relation; $FUN = 1.71 + 0.06 RT$. The relationship between latency and funniness was primarily caused by the reaction to jokes, not caused by difficulties with non-jokes. It should be noted, however, that even the least amusing non-jokes were rated as funny to some extent.

Finally, because the subjective interpretation of funniness differs across individuals, these data were also analyzed for each participant as a further examination of the generality of these results. Correlations between FUN and RT for each person showed that an average of 0.46 sec decrease in RT corresponded to a one unit increase in FUN, $t(70) = 7.13$, $p < .0001$. The quadratic component for this individualized data was slightly positive and not the negative inverted U, $t(70) = 2.07$, $p < .05$.

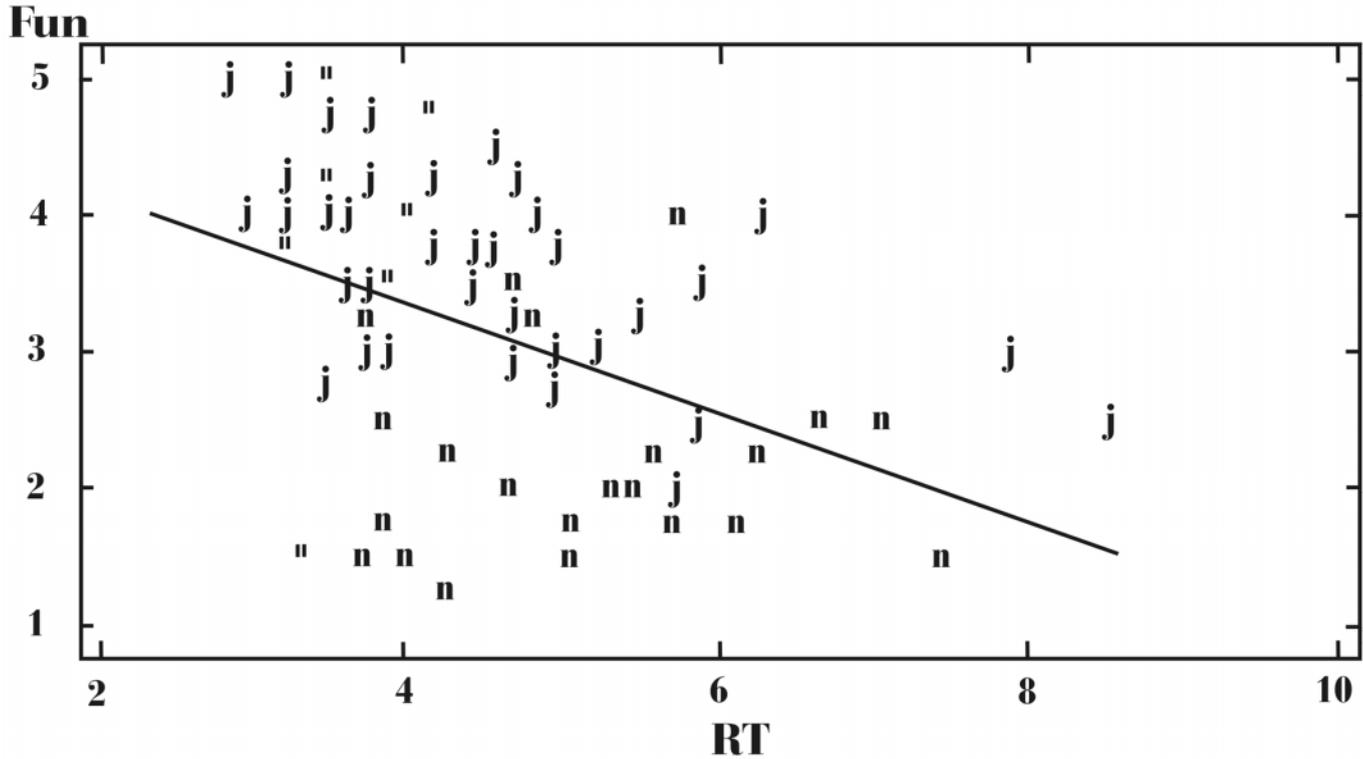


Figure 1. Humor rating (FUN) of jokes (j) and non-jokes (n) as a function of recognition latency in seconds (RT) in experiment I. (") indicates overlapping scores for different items.

After this experiment was completed, Kuipers (2001) reported that joke length correlated positively with funniness ratings. In the study reported here time to read a particular item was slightly and nonsignificantly related to funniness of messages overall or jokes specifically, $r(70) = .16$ and $r(46) = .15$ respectively. These results, then, do not refute Kuipers, but her findings do not account for the decision times in the present study. Indeed, both effects deserve further theoretical consideration and empirical examination.

Also, two recent functional magnetic resonance imaging (fMRI) studies have reported latencies for joke and non-joke appreciation (Goel and Dolan 2001; Mobbs et al. 2003). Their approach was different from this study as the main purpose was to measure cortical activity. Consequently, the jokes and non-jokes had to be “blocked,” that is presented sequentially in separate groups, so that the images could be summed for meaningful cortical readings. Furthermore, the participants responded when they found the joke funny rather than when they recognized it as a joke. These requirements could require somewhat different decision processes. Still, it is surprising that the fMRI experiments did not obtain results similar to those reported here. In those studies non-jokes were responded to more quickly than jokes and no relation was reported between funniness and latency. In the research reported here, however, joke recognition was taken as a more automatic and direct test of joke comprehension. As will be suggested later, these different levels of analysis deserve further examination with related, converging techniques.

4. Experiment II

To assess the role of salient content in the latency of recognition and the appreciation of jokes, additional materials were selected that depended on examples of stereotypical behavior of males or females for humor. Since this material would be expected to be more readily recognized as humor by the non-targeted sex, it was predicted that males would more quickly recognize and respond with higher humor ratings to female targeting and vice-versa. Of course, as Lampert and Ervin-Tripp (1998) point out in their extensive review, the relation between gender and humor appreciation is far from simple. Males sometimes respond more favorably to female targeting but females do not always react so directly to male targeting material (Derks et al. 1998). In any case, the approach seemed a

plausible way to test the role of salience in joke recognition and humor appreciation.

5. Method

5.1. Participants

Sixty-two females and twenty-two males volunteered as part of a requirement for introductory psychology. This approximately 3 to 1 ratio is typical of the sampled population.

5.2. Materials

Three jokes and five non-jokes were selected as representative from experiment I and four jokes from the experimenters' repertoire, two male targeting and two female targeting, were added.

5.3. Procedure

The task was the same as for experiment I. The body of the joke or message was followed by the "punch phrase" or conclusion. The participants judged it to be a joke or not and gave it a rating from 0 to 9.

6. Results

6.1. Jokes vs. non-jokes

Jokes were recognized as jokes 83% of the time and non-jokes were called jokes 33%. The jokes received an average rating of 4.54 and non-jokes were 2.13. Since there were fewer examples these effects did not reach significance. Never the less, the values approximated those of experiment I.

6.2. Response latency and funniness rating

Figure 2 shows the distribution of ratings (FUN) and recognition latency in seconds (RT) for the 12 stories in experiment II. Joke recognition latency and humor ratings were negatively correlated, $r(10) = -.43$, a

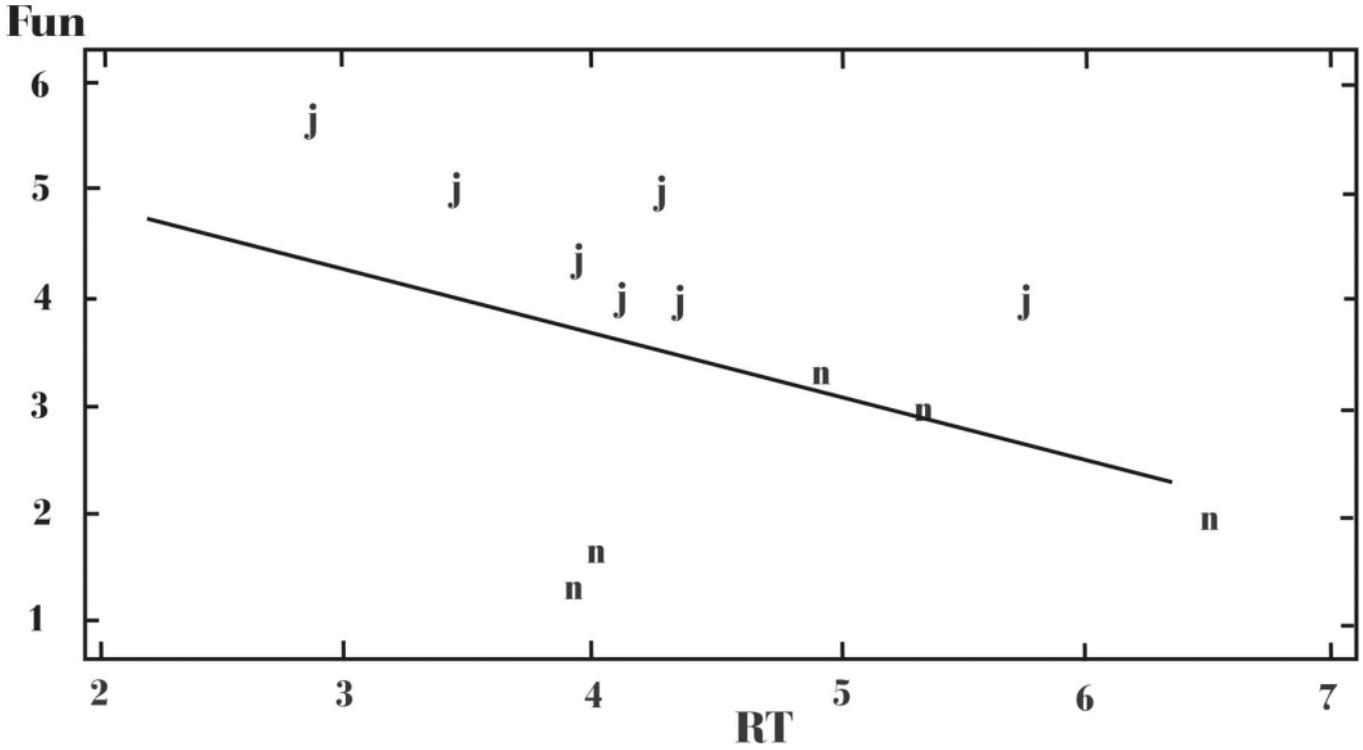


Figure 2. Humor rating (FUN) of jokes (j) and non-jokes (j) as a function of recognition latency in seconds (RT) in experiment II.

similar value to experiment I. To test linearity, regressions were calculated for each participant predicting funniness ratings from recognition latencies. This analysis showed an average linear trend such that a 0.46 sec decrease in RT corresponded to a one unit increase in FUN, $t(82) = 6.18$, $p < .0001$. A further regression showed the quadratic component (using the square of the recognition latencies) was not significant for these data.

Figure 2 also shows the best fit function between FUN and RT, $FUN = 6.05 - 0.58 RT$. The seven joke points fall close to a straight line. Two of the non-jokes, however, had intermediate latencies and low funniness ratings producing something like an inverted U for five items not intended to be funny. Perhaps these non-jokes were like the contrived stimuli of the studies cited in the introduction.

6.3. *Stereotype*

Of primary interest in this experiment was the effect of salient scripts on joke recognition latency and humor appreciation. Since some jokes targeted males and some jokes targeted females with both sexes in the experimental sample, an effect might emerge as an interaction between jokes and sex.

For RT the stories caused different latencies, $F(11, 82) = 10.51$, $p < .0001$, and the sexes did not. The hypothesized interaction was also insignificant. For FUN the various jokes and non-jokes were significantly different, $F(11, 82) = 36.93$, $p < .0001$. The ratings by sexes were not significantly different, and the interaction for male and female humor ratings of the different jokes also fell short of significance. In spite of the insignificance of the interactions, two jokes deserved closer inspection. Both of them targeted males. One was:

What did God say after he created man?

I can/

do better than this.

Males rated this joke an average of 2.82 while females gave it 4.84, $t(83) = 4.34$, $p < .0001$. The judgement times were 3.71 and 3.99 sec respectively, a nonsignificant difference. The other joke was:

A good way for a husband to get in the last word is to/
apologize.

Males gave this an average rating of 3.00 while for females the average was 4.05, $t(83) = 2.19$, $p < .03$. The respective latencies were a not significantly different 4.27 and 4.02 sec. Males recognized these as jokes as quickly as did the females, but they didn't find them as funny. This conclusion is weakened by the lack of interaction by the analysis of variance, but deserves further investigation. For one thing, the targeting in these jokes is not entirely clear and the stereotyping is uncertain. A better approach might be to use racial stereotypes as primes (Cunningham et al. 2001).¹

7. Discussion

When these participants decided whether a message was a joke or not, the faster they respond that it was a joke the funnier it was rated. This result indicates that easily understood humor is found most amusing. If this is a problem solving task, then simpler problems are preferred. Apparently, for the "expert" appreciation of humor, the peak of the inverted U of complexity and appreciation is shifted so far forward that it disappears. In this context, two points should be made. First, the extremes of the "U" shaped function for humor appreciation probably do exist. A simple message is not a joke and would not be funny no matter how quickly it was recognized. Totally complex nonsense would not be funny no matter how fast or slow the categorization as non-humor. The non-jokes in these experiments were not designed to test this extension. All that is suggested here, then, is an adjustment of the middle portion of the "U" to reflect the increase in funniness of jokes with increased simplicity. Indeed, children might be tested with this procedure to see if jokes do produce the U function for a less expert verbal population. For possible material, see McGhee (2002).

Second, jokes are not the only form of humor. The present study was especially artificial, with timing in the hands of the "audience" rather than the joker. These stories and their punch lines, however, supply the experimental, manipulatable material for humor study. Certainly whatever comes out of the laboratory still requires generalization and validation in the real world. Suggestions by professional comedians on how to be funny do support ease and speed of comprehension as leading to greater appreciation (Dean 2000; Tamblyn 2003).

Although these results do not exactly match the inverted U of the comprehension postulate proposed by Wyer and Collins (1992), the male

stereotype results of experiment II do give partial support their elaboration postulate. This postulate implies that “priming concepts and knowledge in the domain . . . relevant is likely to increase the ease with which implications of the context could be cognitively elaborated.” (677) Increased ease of elaboration would lead to increased appreciation. In experiment II, the implicit comprehension of joke structure (RT) and the more explicit elaboration of joke content (FUN) were disassociated for some material with a male target. To follow a similar model, joke structure or “incongruity + resolution” is more appreciated the more easily it is recognized. Content gains in humor the more “salient (state + trait)” and readily elaborated it is (Derks 1996). Salience, however, may not speed comprehension. Not only are structure and content different theoretical components of humor, they seem to operate differently in the way they are processed. Structure may be recognized implicitly and automatically while content requires explicit, more “conscious,” evaluation. The question of “how funny is it?” helps tell “how is it funny?” (Oring 2003).

There is evidence that both these processes can be primed, possibly independently. Goldstein et al. (1972) primed content and probably improved elaboration. When structure was primed recognition may have been facilitated (Derks and Aurora 1993; Staley and Derks 1995). Both these priming processes and the individual’s personality may make certain solutions more accessible and automatic (Ruch 1992, 1998). The measure in all cases, however, was humor appreciation but not recognition.

Finally, on the production side of humor expertise, it also appears that people who make up funny material often do it “naturally” and automatically. Although strategies are evident in their product (see Rishel 2002), the creators have little insight into where they get their ideas (Gelbart 1999; Simon 1996). A lifetime of humor appreciation and production gives the humor problem solver automatic access to the many entertaining discoveries that comprise the comprehension and enjoyment of what is funny.

College of William and Mary

Notes

Correspondence address: peter.derks@wm.edu

Some of these data were presented at the International Humor Conference in Bergen, Norway, June 25–28, 1998. Thanks to the referees for this paper whose suggestions helped clarify several points.

1. Since the junior author is emeritus and the senior author has gone on to other, not necessarily greener, pastures (last known at Yale University) we will not be continuing to explore these questions. Therefore, to you, gentle reader, we pass the torch . . .

References

- Apter, Michael J.
1982 *The Experience of Motivation: The Theory of Psychological Reversals*. San Diego, CA: Academic Press.
- Berlyne, Daniel E.
1971 *Aesthetics and Psychology*. New York: Appleton Century.
- Cunningham, William A., Kristopher J. Preacher, and Mahzarin R. Banaji
2001 *Implicit Attitude measures: Consistency, stability, and convergent validity*. *Psychological Science* 12, 163–170.
- Dean, Gregg
2000 *Step by Step to Standup Comedy*. Portsmouth, NH: Heinemann.
- Deckers, Lambert
1998 Influence of mood on humor. In Ruch, Willibald (ed.), *The Sense of Humor: Explorations of a Personality Characteristic*. Berlin/New York: Mouton de Gruyter, 309–328.
- Derks, Peter
1996 Twenty years of research on humor: A view from the edge. In Chapman, Antony J., and Hugh C. Foot (eds.), *Humor and Laughter: Theory, Research, and Application* (reissue). New Brunswick, NJ: Transaction, vii–xxiv.
- Derks, Peter, and Sanjay Aurora
1993 Sex and salience in the appreciation of cartoon humor. *Humor: International Journal of Humor Research* 6 (1), 57–69.
- Derks, Peter, Lynn S. Gillikin, Debbie S. Bartolome-Rull, and Edward H. Bogart
1997 Laughter and electroencephalographic activity. *Humor: International Journal of Humor Research* 10 (3), 285–300.
- Derks, Peter, Rosemary E. Staley, and Martie G. Haselton
1998 Sense of humor: Perception, intelligence, or expertise? In Ruch, Willibald (ed.), *The Sense of Humor: Explorations of a Personality Characteristic*. Berlin/New York: Mouton de Gruyter, 143–158.
- Gelbart, Larry
1999 *Laughing Matters*. New York: Random House.
- Goel, Vinod, and Raymond J. Dolan
2001 The functional anatomy of humor: Segregating cognitive and affective components. *Nature Neuroscience* 4, 237–238.
- Goldstein, Jeffrey H., Jerry Suls, and Susan Anthony
1972 Enjoyment of specific types of humor content: Motivation or salience? In Goldstein, Jeffrey H., and Paul E. McGhee (eds.), *The Psychology of Humor: Theoretical Perspectives and Empirical Issues*. New York: Academic Press, 159–171.
- Graesser, Arthur C., Debra L. Long, and Jeffrey S. Mio
1989 What are the cognitive and conceptual components of humorous text? *Poetics* 18, 143–163.

- Herzog, Thomas R., and Beverly A. Bush
 1994 The prediction of preference for sick humor. *Humor: International Journal of Humor Research* 7 (4), 323–340.
- Herzog, Thomas R., and Andrew J. Hager
 1995 The prediction of preference for sexual cartoons. *Humor: International Journal of Humor Research* 8 (4), 385–405.
- Herzog, Thomas R., and Joseph A. Karafa
 1998 Preference for sick versus nonsick humor. *Humor: International Journal of Humor Research* 11 (3), 291–312.
- Holmes, Douglas S.
 1969 Sensing humor: Latency and amplitude of response related to MMPI profiles. *Journal of Consulting and Clinical Psychology* 33, 296–301.
- Hoppe, Ronald A.
 1976 Artificial humor and uncertainty. *Perceptual and Motor Skills* 42, 1051–1056.
- Kreiner, David S.
 1995 Effects of memory load on jokes and logical decision tasks. *Psychological Reports* 77, 243–252.
- Kuipers, Giselinde
 2001 *Goede Humor: Slechte Smaak*. Amsterdam: Boom.
- Lampert, Martin D., and Susan M. Ervin-Tripp
 1998 Exploring paradigms: The study of gender and sense of humor near the end of the 20th century. In Ruch, Willibald (ed.), *The Sense of Humor: Explorations of a Personality Characteristic*. Berlin/New York: Mouton de Gruyter, 231–270.
- Mahony, Diana L.
 1999 The mechanical mind: Bergson meets the information processing model. *Humor: International Journal of Humor Research* 12 (2), 161–175.
- Martindale, Colin, Kathleen Moore, and Alan West
 1988 Relationship of preference judgements to typicality, novelty, and mere exposure. *Empirical Studies of the Arts* 6, 79–86.
- McGhee, Paul E.
 1976 Children's appreciation of humor: A test of the cognitive congruency principle. *Child Development* 47, 420–426.
 1999 Review of Ruch 1998. *Humor: International Journal of Humor Research* 12 (3), 327–333.
 2002 *Stumble Bees and Pelephones: How to Develop a Powerful Sense of Humor*. Dubuque, IO: Kendall/Hunt.
- Mobbs, Dean, Michael D. Greicius, Eiman Abdel-Azim, Vinod Menon, and Allan L. Reiss
 2003 Humor modulates the mesolimbic reward centers. *Neuron* 40, 1041–1048.
- Oring, Elliott
 2003 *Engaging Humor*. Champaign: University of Illinois.
- Raskin, Victor
 1998 The sense of humor and the truth. In Ruch, Willibald (ed.), *The Sense of Humor: Explorations of a Personality Characteristic*. Berlin/New York: Mouton de Gruyter, 95–108.
- Rishel, Mary Ann
 2002 *Writing Humor: Creativity and the Comic Mind*. Detroit: Wayne State.

- Ruch, Willibald
1992 Assessment of appreciation of humor: Studies with the 3WD Humor Test. In Spielberger, Charles D., and James N. Butcher (eds.), *Advances in Personality Assessment*, vol. 9. Hillsdale, NJ: Erlbaum, 27–75.
1998 (ed.), *The Sense of Humor: Explorations of a Personality Characteristic*. Berlin/New York: Mouton de Gruyter.
- Simon, Neil
1996 *Rewrites*. New York: Simon and Schuster.
- Staley, Rosemary E., and Peter Derks
1995 Structural incongruity and humor appreciation. *Humor: International Journal of Humor Research* 8 (2), 97–134.
- Tamblyn, Doni
2003 *Laugh and Learn: 95 Ways to Use Humor for More Effective Teaching and Training*. New York: Amcom.
- Wicker, Frank W., Irene M. Thorelli, William L. Barron III, and Margueritte R. Ponder
1981 Relationships among affective and cognitive factors in humor. *Journal of Research in Personality* 15, 359–370.
- Wilson, Christopher P.
1979 *Jokes: Form, Content, Use, and Function*. London: Academic.
- Wyer, Robert S., Jr., and James Collins II
1992 A theory of humor elicitation. *Psychological Review* 99, 663–688.
- Zajonc, Robert B.
1968 Attitudinal effects of mere exposure. *Journal of Personality and Social Psychology Monograph Supplement* 9 (2, part 2), 1–27.
- Zigler, Edward, Jacob Levin, and Laurence Gould
1967 Cognitive challenge as a factor in children's humor appreciation. *Journal of Personality and Social Psychology* 6, 332–336.

