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# Humor in the Eye Tracker: Attention Capture and Distraction from Context Cues

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ABSTRACT. The *humor effect* refers to a robust finding in memory research that humorous information is easily recalled, at the expense of recall of nonhumorous information that was encoded in close temporal proximity. Previous research suggests that memory retrieval processes underlie this effect. That is, free recall is biased toward humorous information, which interferes with the retrieval of nonhumorous information. The present research tested an additional explanation that has not been specifically addressed before: Humor receives enhanced attention during information encoding, which decreases attention for context information. Participants observed humorous, nonhumorous positive, and nonhumorous neutral texts paired with novel consumer brands, while their eye movements were recorded using eye-tracker technology. The results confirmed that humor receives prolonged attention relative to both positive and neutral nonhumorous information. This enhanced attention correlated with impaired brand recognition.

Keywords: attention, eye tracking, humor, memory

ONE OF THE MOST ROBUST FINDINGS IN MEMORY RESEARCH is that people are good at recalling unusual or unexpected events. Imagine, for example, one of your colleagues turning up in a Mickey Mouse costume during a serious business meeting. It is likely that you would still remember this incident a month later, whereas you forgot what your other colleagues were wearing and what kind of lunch you had after the meeting. A prime example of a distinctive event is when something very humorous happens. Interestingly, enhanced memory

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for humor often decreases memory for unrelated nonhumorous information that was encountered in close temporal proximity. In memory research, the enhanced memory for humor, at the expense of memory for nonhumor, has been termed the *humor effect* (Schmidt, 1994; 2002; Schmidt & Williams, 2001). Although the humor effect was robust in previous studies, its underlying mechanisms are still under debate.

Processes at both memory encoding and at memory retrieval may account for the suppressed memory for unrelated nonhumorous information. The latter mechanism has gained the most support in the relevant literature (Bruce & Gaines, 1976; McDaniel, DeLosh, & Merritt, 2000; McDaniel, Dornburg, & Guynn, 2005; Schmidt, 2002). This retrieval account entails that the memory representation of humorous information is distinctively "marked," which gives it an advantage at retrieval. The retrieval account may explain why humor impairs the free recall of nonhumorous context information. Free recall tasks usually refer explicitly to the learning context (e.g., "Try to recall as many sentences from the study list as possible"). Hence, the participant intentionally thinks back and is able to reexperience the humor that was perceived in the learning context (Richardson-Klavehn & Bjork, 1988; Schacter, 1987). This reexperience of humor, in turn, may interfere with the retrieval of nonhumor. The retrieval benefits of humor are illustrated by previous findings that when humor is learned in conjunction with nonhumor, participants typically recall the humorous information before nonhumorous information (Schmidt, 1994, 2002).

However, several scholars have mentioned that differential processing of humor—that is, enhanced attention during information encoding—may also play a role (see Hirshman, 1988;Schmidt, 1991; Slamecka & Katsaiti, 1987;Waddill & McDaniel, 1998; Weinberger & Gulas, 1992). This view differs from the retrieval view by stating that there is nothing distinctive about the storage of humor in memory. Rather, it is assumed that humor is better remembered because it is more deeply or elaborately processed at encoding (Schmidt, 1991; Waddill & McDaniel, 1998). This elaborate processing of humor may result from humor being relatively "uncommon" with respect to its nonhumorous context (Schmidt, 1991) or from efforts to resolve its inherent incongruities (Raskin, 1985; Suls, 1972). Alternatively, humor may receive enhanced attention because of the positive emotion that it elicits (see Bradley, Cuthbert, & Lang, 1996; Buodo, Sarlo, & Palomba, 2002; Calvo & Lang, 2004; Lang, Greenwald, Bradley, & Hamm, 1993). Differential processing of humor may also explain why humor reduces the memory for nonhumorous context information. Given that perceivers have to divide their attention between humor and nonhumor, it is likely that most of their cognitive resources will be spent on the processing of humor, which leaves fewer resources available for processing the nonhumorous context.

Although there is theoretical reason to assume that humor receives more elaborate processing than nonhumor, there is little empirical evidence to support this notion. If humor interferes with the encoding of context information, it should

impair not only free recall but also cued memory performance. Yet, the humor effect is typically found with free recall, not with cued recall or recognition tasks (e.g., Berg & Lippman, 2001; Krishnan & Chakravarti, 2003; Murphy, Cunningham, & Wilcox, 1979; Schmidt, 1994; 2002; Schmidt & Williams, 2001). Thus, although previous research has yielded quite consistent evidence that humor interferes with the memory retrieval of nonhumorous context information, the effect of humor on attention at information encoding is unclear. This lack of knowledge raises the important question of whether applying humor in persuasion and education harms outcomes that require cued memory, such as multiple choice exams, political elections, browsing through the shelves in a shop. In the present study, we intend to fill this gap in the literature.

To assess the impact of humor on attention, we recorded online attention for humorous texts using eye-tracking technology. This is a novel approach in research on humor and memory, which to date has focused solely on off-line (i.e., afterward) memory performance. As control conditions, we used two types of texts: (1) nonhumorous, neutral texts and (2) nonhumorous texts that were as equally positive as the humorous texts. The latter text type was included to test whether enhanced attention is unique to humor or can be generalized to other types of positive stimuli. We presented all participants with these three types of texts and expected that humorous texts would receive more visual attention than the two other types of text. In addition, we investigated how differences in attention relate to memory encoding of context information. To this end we presented novel consumer brands in the context of each type of text and measured afterward brand recognition.

## EXPERIMENT 1

### Method

#### Participants and Design

Fifty-eight students participated (13 males, 45 females), receiving €4 in return. The experiment had a repeated measures design with type of text (humorous, positive, or control) as the single factor.

#### Stimulus Materials

We selected 45 texts for Experiments 1 and 2 (for examples of the texts used, see Appendix). Of these texts, 15 were humorous, 15 evoked positive feelings but were nonhumorous (which we will refer to as *positive* texts), and 15 were neutral on both humorousness and positivity and served as *control* texts. Sentence structure and number of words per text was kept constant across conditions.

We ran a separate pilot study among 24 participants to verify that the texts fitted our manipulation goals. In the first phase of the pilot study, participants paced through all 45 texts one at a time and indicated what feelings the texts


Na twee weken vakantie vallen de twee prille geliefden elkaar weer in de armen.

**FIGURE 1. Sample screenshot of the visual display presented to the participants in Experiments 1 and 2.**

evoked on a 7-point scale (1 = *very negative* to 7 = *very positive*). The humorous texts ($M = 4.51$) and positive texts ($M = 4.82$) evoked more positive feelings than the control texts ($M = 3.98$), respectively $t(23) = 2.76$, $p < .02$ and $t(23) = 2.97$, $p < .02$. The humorous texts and the positive texts did not differ on evoked affect, $t(23) = 1.45$, $p = .16$. In the second phase of the pilot test, participants indicated to what extent they found the texts humorous on a 7-point scale (1 = *not at all humorous* to 7 = *very humorous*). The humorous texts ($M = 4.30$) were indeed rated more humorous than the positive ($M = 1.91$) and control texts ($M = 1.58$), respectively $t(23) = 11.00$, $p < .01$ and $t(23) = 11.98$, $p < .01$.

In the experiment, the texts were presented in square frames of size 300 × 300 pixels. The brands were pictures of three existing foreign energy drink brands that were 120 pixels in width and 300 pixels in height. These brands were unknown in the country where the experiment was conducted. The computer screen was 40.5 cm in width and 30.2 cm in height, and the screen resolution was 1280 × 1024 pixels. For an example of the visual display presented to the participants, see Figure 1.

## Procedure

On entering the lab, participants were seated behind the eye tracker. To reduce head movements, the participants' head was mounted in a chin-and-forehead-rest that also contained the eye camera. Next, participants followed the instructions on the computer, which explained that pairs of texts and pictures would be presented. To assure the attention of the participants to the texts, participants were asked to read all texts of each brand–text pair. The brand–text pairs were positioned screen-centered against a white background, with their midpoints at a 200 pixels distance from the screen center. Each of the three brands was presented next to 15 different texts of one type, leading to 45 experimental trials. To assure an even

balance between neutral and positive stimuli, another 15 filler brand-text pairs were added that contained neutral texts and one novel filler brand.

Each participant saw the same 60 texts and 4 brands, but the assignment of brands to text conditions was randomized between participants. Locations of brands (i.e., left or right) were randomized within participants. Participants viewed each brand-text pair at a distance of approximately 55 cm. Brand-text pairs were presented for 6,000 ms each, preceded by a central fixation cross of a duration of 1,000 ms. Participants were instructed to look directly at the fixation cross while it was on the screen. Before the experiment, participants practiced the task with a different set of filler brands and texts.

### Eye Tracking

During stimulus presentation, participants' eye movements were recorded using a video-based eye tracker (SMI iView X, Senso Motoric Instruments, Teltow, Germany). iView X finds the darkest part of the eye image (the pupil) and the brightest part of the eye image (the corneal reflex) and measures the position of the center of the pupil with respect to the corneal reflex. The position of the participant's eye position was recorded at a rate of 500 Hz. Data collection followed a standard calibration procedure in which the participant was asked to look at nine predefined points on the screen. Data from each trial comprised 3000 ($x$, $y$) coordinate pairs, detailing the eye position every 2 ms. Data analyses determined the average time per trial that the gaze coordinates fell within the 300 $\times$ 300 pixel square frames in which the texts were presented.

### Recognition Task

After stimulus presentation in the eye tracker, participants moved to a different computer to finish the experiment. They performed a 5-min filler task (solving anagrams) before completing an unexpected recognition task. In this task, a series of 24 energy drink brands was presented in random order, composed of four brands that had been presented in the first part of the experiment (i.e., the three target brands and one filler brand) and 20 novel brands. Participants were asked to indicate as quickly and accurately as possible whether they had seen these brands before. Responses were made by pressing a left "seen before" or right "not seen before" key on the keyboard.

## Results and Discussion

### Eye-Tracking Data

A repeated measures analysis of variance (ANOVA) tested for the effect of type of text (humorous, positive, or control) on text viewing time. This analysis

revealed a significant effect of type of text, $F(2, 56) = 72.52$, $p < .01$, $\eta^2 = .72$. In line with the hypothesis that humor attracts more attention than nonhumor, *t*-tests revealed that participants on average spent more time looking at humorous texts ($M = 4933$ ms) than positive texts ($M = 4284$ ms), $t(57) = 10.30$, $p < .01$, and control texts ($M = 4345$ ms), $t(57) = 11.10$, $p < .01$. There was no difference between the attention paid to positive and control texts, $t(57) = 1.10$, $p = .27$[1].

**Recognition Data**

A repeated measures ANOVA revealed a significant effect of type of text (humorous, positive, or control) on brand recognition accuracy, $F(2, 56) = 7.59$, $p < .01$, $\eta^2 = .21$. Only 64% of the participants correctly recognized the brand presented in the context of humorous texts. This percentage was significantly higher for brands presented in the context of positive texts (88%), $t(57) = 3.91$, $p < .01$, and control texts (83%), $t(57) = 2.39$, $p = .02$. There was no difference between the positive and control condition, $t(57) < 1$, *ns*. The speed of the correct answers was the same across conditions, *t*s $< 1.82$.

**Relation between Text Viewing and Brand Recognition**

To test whether reduced brand recognition in the humor condition was related to longer text viewing, we calculated a point bi-serial correlation between the time spent looking at the humorous texts and the dichotomous variable of recognizing the brand or not. As expected, viewing time was negatively related to recognition accuracy, $r_{pb} = -.27$, $p = .04$.

These results show that humor receives more attention than nonhumor and thereby impairs recognition of context information. In Experiment 1, participants were explicitly asked to focus their attention on the humorous and nonhumorous texts. This instruction ensured that initial attention was drawn to the texts on each trial, either humorous or not. The differences in viewing times observed in Experiment 1 may therefore be attributed to the attention *holding* property of humor. However, this instruction is left out in most advertising and teaching situations. It is therefore also interesting to examine the attention pattern when text and brand viewing are left free. In that case, the attention *getting* and attention *holding* properties of humor jointly determine text and brand viewing. Experiment 2 aimed to examine this issue. A second aim was to determine whether attention for humor and brand memory correlate linearly. We increased the within-cell variation of brand recognition by pairing each type of text with three different brands instead of one.

## EXPERIMENT 2

### Method

#### Participants and Design

Thirty students participated (10 males, 20 females), receiving €4 in return. The experiment had a repeated measures design with type of text (humorous, positive, or control) as the single factor.

#### Stimulus Materials and Procedure

The humorous, positive, and control texts were the same as in Experiment 1. Experiment 2 resembled Experiment 1 for the most part, but two alterations were made. First, the task instruction was slightly modified. After informing participants that pairs of texts and pictures would be presented, the instructions asked participants to look at the pictures and texts freely. Second, the number of brands within each condition was increased. A total of nine brands were evenly allocated across the conditions (i.e., three brands per condition). Each brand was presented next to five different texts of one type, totaling 45 experimental trials. To reduce the chance that brand recognition would be considerably impaired because of the reduction of the number of brand exposures, we extended the presentation of the brand-text pairs to 8,000 ms. Similar to Experiment 1, the assignment of brands to text types was randomized between participants, and locations of brands (i.e., left or right) were randomized within participants.

### Results

The statistical significances of Experiment 2 are shown for one-sided tests because of a priori predictions about the direction of the effects.

#### Eye-Tracking Data

As in Experiment 1, the data from each trial were analyzed to determine the average time per trial that the gaze coordinates fell within the 300 × 300 pixel area in which the texts were presented. A repeated measures ANOVA tested for the effect of type of text (humorous, positive, or control) on text viewing time. This analysis indicated a significant effect of type of text, $F(2, 28) = 59.71$, $p < .01$, $\eta^2 = .81$. Again, the average viewing time of humorous texts was longer ($M = 5384$ ms) than that of positive texts ($M = 4489$ ms), $t(29) = 10.70$, $p < .01$, or control texts ($M = 4535$ ms), $t(29) = 9.52$, $p < .01$. There was no difference in the attention paid to positive and control texts, $t(29) = 0.67$, $p = .51$[2] .

### Recognition Data

The percentage of correct answers to the recognition task did not significantly differ between conditions, *t*s < 1.44, which may be due to an overall low error rate (6%). However, the speed of the correct answers provides an indication of the accessibility of the brands in memory. The reaction times of the correct responses were log-transformed before analysis in order to obtain normally distributed data (Ratcliff, 1979; 1993). The statistical analyses were performed on these log-transformed data, but for the sake of interpretability, the untransformed data are presented here.

A repeated measures ANOVA revealed that type of text had a significant main effect on brand recognition speed, $F(2, 26) = 2.91$, $p = .04$, $\eta^2 = .18$. Simple contrast analyses indicated that the brands paired with humorous texts were recognized slower ($M = 865$ ms) than the brands paired with positive texts ($M = 799$ ms), $t(27) = 2.45$, $p = .01$, and the control brands ($M = 813$ ms), $t(29) = 1.69$, $p = .05$. There was no difference between the positive and the control condition, $t(29) = 0.56$, $p = .29$.

### Relation Between Attention and Recognition

There was a significant correlation between longer text viewing and slower brand recognition in the humor condition, $r(30) = .37$, $p = .03$. This result indicates that enhanced attention to humorous texts impairs brand recognition.

## GENERAL DISCUSSION

By using eye-tracking technology, these two studies provide evidence that humor receives enhanced *attention* relative to nonhumorous positive and neutral stimuli, and thereby reduces the encoding of nonhumorous context information. Previous work on the humor effect suggested that humor affects memory performance because its privileged retrieval may interfere with the retrieval of nonhumor (e.g. Schmidt, 2002). The present study extends this work by showing that humor already receives enhanced attention at encoding. Moreover, our findings demonstrate that humor not only impairs the free recall of context information but also affects cued memory processes such as recognition. This finding is important for the use of humor in applied settings, such as identifying advertised brands in a supermarket.

The present research is one of the first to contrast the distracting effect of humor with equally positive, nonhumorous information. Our conclusions differ somewhat from previous conclusions that "humor strength" decreases memory for unrelated advertising claims (Krishnan & Chakravarti, 2003). Humor strength represents the level of humor appreciation, which relates to the positive emotion or reward elicited by humor (see Mobbs, Greicius, Abdel-Azim, Menon, & Reiss,

2003). In contrast, our findings suggest that the elicitation of positive emotions is not responsible for the distraction provided by humor. It is possible that the distraction of strong humor observed before (e.g., Krishnan and Chakravarti, 2003) was because of factors that were confounded with humor strength. For example, previous research suggested that the level of incongruence (Lee & Mason, 1999), aggressiveness (McCauley, Woods, Coolidge, & Kulick, 1983), and sexual and sexist content (Love & Deckers, 1989) of humor are all related to humor appreciation. Future research could further examine whether the distraction provided by humor depends on its emotional impact.

The finding that humor distracts attention from context information has several practical implications. For advertisers, the present research indicates that humor that is unrelated to the central message in advertisements distracts from brand encoding. This, however, does not mean that unrelated humor should not be used in advertisements. Recent findings show that whereas explicit memory for brand information is reduced by humor, implicit memory for brand information remains unaffected (Krishnan & Chakravarti, 2003). Moreover, brand evaluations have been shown to relate more to implicit memory than to explicit memory (Hansen & Wänke, in press). Hence, humor may impair the explicit recognition of brands but may still enhance brand evaluations and purchase intentions (Strick, Van Baaren, Holland, & Van Knippenberg, 2009). In contrast, in educational settings, explicit recognition or recall of study material is very important. Although privileged attention for humor may benefit learning when used to illustrate important concepts (Kaplan & Pascoe, 1977), the present research indicates that humor that is unrelated to the study material may impair learning. In summary, whether humor could be successfully applied in communication depends on the importance of explicit memory (above and beyond implicit memory) and the relevance of the humor in the learning context.

In conclusion, the present data show that the impact of humor on memory for context information is not exclusively due to retrieval processes. Humorous text draws more attention than nonhumorous text and thereby impairs memory for unrelated context.

## NOTES

1. Analysis of the product-viewing times indicated that participants spent significantly less time looking at brands presented in the context of humorous texts than at brands presented in the context of positive texts and control texts.
2. Again, participants spent significantly less time looking at brands presented in the context of humorous texts than at brands presented in the context of positive texts and control texts.

## AUTHOR NOTES

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## REFERENCES

Berg, E. M., & Lippman, L. G. (2001). Does humor in radio advertising affect recognition of novel product brand names? *Journal of General Psychology*, *128*, 194–205.

Bradley, M. M., Cuthbert, B., & Lang, P. J. (1996). Picture media and emotion: Effects of sustained affective context. *Psychophysiology*, *33*, 662–670.

Bruce, D., & Gaines, M.T. (1976). Tests of an organizational hypothesis of isolation effects in free recall. *Journal of Verbal Learning and Verbal Behavior*, *15*, 59–72.

Buodo, G., Sarlo, M., & Palomba, D. (2002). Attentional resources measured by reaction times highlight differences within pleasant and unpleasant, high arousing stimuli. *Motivation and Emotion*, *26*, 123–138.

Calvo, M. G., & Lang, P. J. (2004). Gaze patterns when looking at emotional pictures: Attention and affect. *Motivation and Emotion*, *28*, 221–243.

Hansen, J., & Wänke, M. (in press). Liking what's familiar: The importance of unconscious familiarity in the mere-exposure effect. *Social Cognition*.

Hirshman, E. (1988). The expectation-violation effect: Paradoxical effects of semantic relatedness. *Journal of Memory and Language*, *27*, 40–58.

Kaplan, R. M., & Pascoe, G. C. (1977). Humorous lectures and humorous examples: Some effects upon comprehension and retention. *Journal of Educational Psychology*, *69*, 61–65.

Krishnan, H. S. & Chakravarti, D. (2003). A process analysis of the effects of humorous advertising executions on brand claims memory. *Journal of Consumer Psychology*, *13*, 230–245.

Lang, P. J., Greenwald, M. K., Bradley, M. M., & Hamm, A. (1993). Looking at pictures: Affective, facial, visceral, and behavioural reactions. *Psychophysiology*, *30*, 261–273.

Lee, Y. H., & Mason, C. (1999). Responses to information incongruency in advertising: The role of expectancy, relevancy, and humor. *Journal of Consumer Research*, *26*, 156–169.

Love, A. M., & Deckers, L. H. (1989). Humor appreciation as a function of sexual, aggressive, and sexist. *Sex Roles*, *20*, 649–654.

McCauley, C., Woods, K., Coolidge, C., & Kulick, W. (1983). More aggressive cartoons are funnier. *Journal of Personality and Social Psychology*, *44*, 817–823.

McDaniel, M. A., DeLosh, E. L., & Merritt, P. S. (2000). Order information and retrieval distinctiveness: Recall of common versus bizarre material. *Journal of Experimental Psychology: Learning, Memory and Cognition*, *26*, 1045–1056.

McDaniel, M. A., Dornburg, C. C., & Guynn, M. J. (2005). Disentangling encoding versus retrieval explanations of the bizarreness effect: Implications for distinctiveness. *Memory & Cognition*, *33*, 270–279.

Mobbs, D., Greicius, M. D., Abdel-Azim, E., Menon, V., & Reiss, A. L. (2003). Humor modulates the mesolimbic reward centers. *Neuron*, *40*, 1041–1048.

Murphy, J. H., Cunningham, I. C. M., & Wilcox G. (1979). The impact of program environment on recall of humorous television commercials. *Journal of Advertising Research*, *8*, 17–21.

Raskin, V. (1985). *Semantic mechanisms of humor*. Boston, MA: Reidel.
Ratcliff, R. (1979). Group reaction time distributions and an analysis of distribution statistics. *Psychological Bulletin*, *86*, 446–461.
Ratcliff, R. (1993). Methods for dealing with reaction time outliers. *Psychological Bulletin*, *114*, 510–532.
Richardson-Klavehn, A., & Bjork, R. A. (1988). Measures of memory. *Annual Review of Psychology*, *39*, 457–543.
Schacter, D. L. (1987). Implicit memory: History and current status. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *13*, 501–513.
Schmidt, S.R. (1991). Can we have a distinctive theory of memory? *Memory & Cognition, 19*, 523–542.
Schmidt, S. R. (1994). Effects of humor on sentence memory. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *20*, 953–967.
Schmidt, S. R. (2002). The humour effect: Differential processing and privileged retrieval. *Memory*, *10*, 127–138.
Schmidt, S. R. & Williams, A. R. (2001). Memory for humorous cartoons. *Memory & Cognition*, *29*, 305–311.
Slamecka, N. J. & Katsaiti, L. T. (1987). The generation effect as an artifact of selective displaced rehearsal. *Journal of Memory and Language*, *26*, 589–607.
Strick, M., Van Baaren, R. B., Holland, R. W., & Van Knippenberg, A. (2009). Humor in advertisements enhances product liking by mere association. *Journal of Experimental Psychology: Applied*, *15*, 35–45.
Suls, J. M. (1972). A two-stage model for the appreciation of jokes and cartoons: An information processing analysis. In J. H. Goldstein & P. E. McGee (Eds.), *The psychology of humor: Theoretical perspectives and empirical issues* (pp. 81–100). New York: Academic Press.
Waddill, P. J., & McDaniel, M. A. (1998). Distinctiveness effects in recall: Differential processing or privileged retrieval? *Memory & Cognition*, *26*, 108–120.
Weinberger, M. G., & Gulas, C. S. (1992). The impact of humor in advertising: A review. *Journal of Advertising*, *21*, 35–59.

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## APPENDIX

**Table A1. Examples of Stimulus Texts**

| | |
|---|---|
| Humorous | There are 10 types of people that understand binary. Those that do and those that don't.<br>The bargain store promised a free calculator with every purchase. I wouldn't count on it.<br>A blonde with her hair dyed brown: artificial intelligence.<br>Great news for music lovers. This year Michael Jackson is getting back together.<br>The spider was turned down for the position as web designer. |
| Positive | Joost was overjoyed when he walked into the bar. He had just won tickets to the world cup finals.<br>Linda and Marco have broad smiles on their faces. They are expecting their first child.<br>Finally it's summer! I lay outside in the sun the whole day.<br>Tonight Maarten surprises his girlfriend. He has cooked a delicious three-course meal.<br>Isabelle received the gold medal with tears in her eyes. |
| Control | Robert uses the bus every day to get to work and home. The stop is right by his house.<br>You can purchase various types of mixers on eBay. They are for sale from 10 Euros.<br>Please put the lights on. I am trying to read a book.<br>The door is open most of the day. Mister Becker closes it at seven.<br>Frank prefers to eat dinner in front of the TV. |

*Note*. The texts used in the experiments were in Dutch.