

Comprehensibility ratings of concrete and abstract sentences

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Comprehensibility ratings are given for 54 concrete and 54 abstract sentences written as actives, passives, and interrogatives. Analysis of the ratings showed that the concrete sentences were easier to understand than the abstract sentences, but all three sentence forms were equally comprehensible.

A number of recent investigations have examined the effect of concreteness on the retention of prose material. In agreement with the results of research using individual words, these studies suggest that concrete, easily imaged sentences or prose passages are remembered better than corresponding material of more abstract content. This difference has been attributed to the greater ease of storing concrete material in a highly memorable form as visual images (Paivio, 1971).

However, Johnson, Bransford, Nyberg, and Cleary (1972) have pointed out that concrete sentences, in addition to being more imageable, are also easier to comprehend than abstract sentences. This difference in ease of comprehension, observed with both reaction time measures (Holmes & Langford, 1976; Klee & Eysenck, 1973) and subjective ratings (Johnson et al., 1972; Kuiper & Paivio, 1977) confounds an imagery interpretation of retention differences between concrete and abstract material. Consequently, researchers exploring the concreteness factor in sentence memory have attempted to equate concrete and abstract sentences for comprehensibility (Kuiper & Paivio, 1977; Moeser, 1974, 1975).

The present report makes available a set of concrete and abstract sentences that have been scaled for comprehensibility in each of three forms: active, passive, and interrogative. While research to date has concentrated on active sentences, these materials will also provide an opportunity to examine concreteness and comprehension factors in memory for passives and interrogatives.

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METHOD

Materials

The initial pool of items consisted of 108 sentences in the active voice of the form "The (adjective) (noun) (verb) (article) (adjective) (noun)." One hundred of the sentences (50 concrete and 50 abstract) were those used by Begg and Paivio (1969), and details on their construction may be obtained from that study. Four additional concrete and abstract sentences were constructed by a similar method. Each of the sentences, which are listed in the Appendix to this report, was rewritten in the passive and interrogative voice. For example, the active sentence, "The vicious dog attacked the helpless man," was rewritten as "The helpless man was attacked by the vicious dog" in the passive voice and "Did the vicious dog attack the helpless man?" as an interrogative. Minor alterations in the wording of a few of the transformed sentences (i.e., substituting "the" for "a") were necessary in order to make them more meaningful as judged by the authors. The complete set of 324 sentences is available on request.

Three sets of 108 sentences each were drawn from the pool of 324, with an equal number of actives, passives, and interrogatives in each set. One-half of the sentences of each form were concrete and one-half abstract. The sentences in each set were unique, but each sentence was represented in each of its three versions across all three sets. The order of items within each set was randomized for presentation to the subjects, but the alternate forms of each sentence occurred in the same ordinal position in the three sets.

Procedure

The subjects were given the following instructions: "I'm going to read aloud a number of sentences, one at a time. For each sentence that I read, I want you to decide how easy you think the sentence is to understand or comprehend. You give your answer by circling one of the numbers in the appropriate line on the answer sheet. If you can easily understand the meaning of a sentence, circle 7 for that sentence. If you find a sentence very hard to understand, circle 1. Use the remaining numbers between 1 and 7 to indicate your reaction to sentences that are intermediate in difficulty." The sentences were read to the subjects at a rate of one every 10 sec, with a rest period of about 3 min halfway through the set.

Subjects

Each set of sentences was rated by a group of paid volunteers from undergraduate psychology classes at Memorial University, with 17, 18, and 20 subjects in the three groups.

RESULTS AND DISCUSSION

The mean comprehension rating for each sentence appears in the Appendix. The mean of these means was calculated for each of the six sentence types. For the concrete sentences, the overall mean ratings were 6.40 for actives, 6.40 for passives and 6.37 for interrogatives, with standard deviations of .62, .63, and .66, respectively. The abstract sentences produced ratings of 5.58 for actives, 5.43 for passives, and 5.49 for interrogatives, with standard deviations of .80, .87, and .86. The mean ratings for the 54 sentences of each type were used as the cell entries in an analysis of variance of rated comprehension. The analysis showed a significant effect of concreteness [$F(1,318) = 115, p < .001, MSe = .56$], but no significant effect of syntactic form, and a non-significant interaction.

Product-moment correlation coefficients were also calculated on the ratings for actives, passives, and interrogatives, separately for concrete and abstract sentences. For the concrete sentences, the ratings for actives and passives were correlated .81, actives and interrogatives were correlated .81, and passives and interrogatives .76. For the abstract sentences, the correlation between actives and passives was .68, with a correlation of .74 for actives and interrogatives and also for passives and interrogatives.

In agreement with previous research (Johnson et al., 1972; Kuiper & Paivio, 1977), the concrete sentences were easier to comprehend than the abstract sentences. Marschark and Paivio (1977, Experiment 3) have reported some data that seem to be discrepant with these results. They had subjects rate the "meaningfulness" or ease of understanding of a set of sentences of the same form as the abstracts used here, and found no difference between the ratings of concrete and abstract items. However, they also included a sample of anomalous sentences as part of the rated set. These items may have

inflated the ratings for abstract sentences and obscured any effect of the concreteness variable. The procedure used here and in the studies of Johnson et al. (1972) and Kuiper and Paivio (1977), where no anomalous sentences were included, is probably more sensitive to differences in comprehensibility.

Interestingly, Marschark and Paivio (1977, Experiments 1 and 2) also found that, compared to the rated imagery of sentences, comprehensibility was a minor factor in recall. Imagery was more highly correlated with cued recall scores than comprehensibility, and the correlation between comprehensibility and recall was not significant when the effect of imagery was partialled out. Thus the difference in comprehensibility between concrete and abstract sentences may be a manifestation of their imagery properties, a point which remains to be substantiated by further research.

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Appendix
Rated Comprehensibility of Sentences

	Form		
	Active	Passive	Interrogative
Concrete Sentences			
The crippled juggler sported a gaudy costume.	6.00	5.00	5.94
The savage storm flattened a beautiful flower.	7.00	7.00	6.12
The sharp arrow pierced a frantic bird.	5.94	6.76	6.56
The delicate maiden watched a golden sunset.	6.88	6.61	6.65
The friendly banker purchased a blue automobile.	7.00	7.00	6.94
The arrogant gentleman smoked a rancid cigar.	5.39	5.24	5.35
The caustic prosecutor accused a frightened prisoner.	5.47	5.71	4.78
The fidgety wife folded a crinkled newspaper.	6.44	6.82	7.00
The vindictive teacher slapped a helpless boy.	5.06	5.71	5.12

	Form		
	Active	Passive	Interrogative
The destructive army pillaged a prosperous village.	5.47	5.35	5.94
The brutal officer snapped an abrupt salute.	6.82	5.59	6.39
The talkative admiral attended a costume party.	7.00	6.56	6.71
The pompous monarch married a triumphant queen.	5.47	5.56	4.82
The active volcano destroyed a majestic forest.	6.83	6.76	6.59
The reckless baron flipped a shining coin.	6.47	6.47	6.33
The beautiful woman picked a white daisy.	6.94	7.00	7.00
The wonderful gift preceded the exciting kiss.	6.82	6.94	6.24
The bright headlight illuminated the gloomy street.	6.67	6.88	6.71
The jagged stone shattered a clear window.	7.00	6.94	6.64
The rolling hillside surrounded a muddy valley.	6.61	6.88	6.88
The stubborn proprietor opened an expensive restaurant.	6.00	6.17	5.94
The cheerful artist entertained a lonely damsel.	6.82	6.61	6.82
The loving mother served an excellent family.	6.59	6.24	6.44
The strong policeman ousted a seedy beggar.	5.18	5.47	5.67
The white foam topped a restless sea.	6.33	6.94	5.18
The impulsive builder decorated a stylish cottage.	5.94	5.78	5.82
The young singer caressed a pretty girl.	6.78	6.71	6.35
The greedy attendant devoured a soft pudding.	6.47	6.71	6.61
The muscular blacksmith lifted a bulky hammer.	6.90	6.88	6.94
The bright light blinded a small rabbit.	6.94	7.00	7.00
The fat woman polished a red apple.	6.82	6.85	7.00
The dynamic lecturer captivated an energetic committee.	4.94	6.06	5.80
The hallow tomb housed a decaying corpse.	5.95	5.88	6.06
The buoyant steamer sailed a tossing sea.	6.35	5.76	6.30
The noisy priest amused a lively infant.	6.47	6.95	6.65
The clumsy dog broke the valuable vase.	6.90	6.94	7.00
The falling rock killed a sinful captive.	6.29	6.59	6.80
The colorful snake crushed a screaming beast.	6.94	6.85	6.65
The poor musician played a rusty trumpet.	6.80	6.76	7.00
The aggressive settler felled an immense tree.	6.50	5.94	6.35
The vicious hound chased a wild animal.	6.88	6.94	6.95
The skillful doctor soothed a flaming sunburn.	6.65	6.82	7.00
The old professor occupied a comfortable seat.	7.00	6.94	6.95
The raging elephant trampled an orderly caravan.	5.65	5.70	6.47
The spirited leader slapped the mournful hostage.	6.40	6.29	6.24
The enthusiastic painter sketched the ancient temple.	6.95	6.41	6.82
The tortured slave uttered a deafening shriek.	6.65	6.95	6.65
The polite child presented an aromatic bouquet.	5.29	5.18	5.60
The raging fire gutted a condemned building.	6.76	6.82	6.95
The alert fisherman swatted a buzzing mosquito.	6.94	6.60	6.82
The offensive performer cheered a zealous speaker.	4.90	4.53	4.24
The rickety stagecoach crossed a winding river.	6.60	6.53	6.59
The rich physician carried a black umbrella.	6.85	6.88	6.71
The carefree student climbed a high tower.	6.71	6.94	6.95
Abstract Sentences			
The rural community insured a deprived childhood.	6.53	5.67	5.47
The indecisive argument depressed a waiting group.	6.39	5.88	5.39
The solemn creed encouraged an excessive devotion.	3.94	4.12	3.78
The actual quotation lacked a rational foundation.	5.59	4.50	5.76
The constant hope endured an attempted extinction.	4.12	5.83	3.65
The popular view raised a considerable discrepancy.	4.83	4.24	4.17
The recent speculation provided an acceptable solution.	5.94	6.41	6.33
The revised procedure facilitated an expected outcome.	4.89	4.29	4.76
The strict requirements hindered a large attendance.	6.44	6.18	5.65
The remaining duty involved a standard payment.	5.71	5.12	5.39
The free country organized a private venture.	5.53	6.41	6.00
The national election indicated a secure future.	6.24	6.17	6.76
The dull description constituted a boring chapter.	6.47	6.28	6.29
The annual report recommended a complete renovation.	6.83	5.65	6.35
The available literature cited a useful article.	6.24	5.18	5.61
The stark truth created a chaotic condition.	5.41	4.53	5.00
The absolute faith aroused an enduring interest.	5.29	4.33	4.59
The analytic view maintained an objective position.	3.67	4.00	4.71

	Form		
	Active	Passive	Interrogative
The unfair attitude destroyed a promising idea.	6.53	6.82	6.50
The entire episode prefaced a foreign affair.	4.72	4.18	4.59
The unpleasant atmosphere replaced a dismal silence.	6.29	6.22	5.12
The mistaken assumption preserved a naive rationale.	4.00	3.44	3.35
The plausible address answered a contradictory reply.	4.94	5.18	4.72
The limited text explained the complicated formula.	6.41	6.53	6.22
The close supervision guaranteed a strict obedience.	6.44	6.76	6.65
The mediocre demonstration inspired a select few.	3.76	4.56	4.35
The extensive investigation furnished a reasonable criticism.	5.94	5.76	6.45
The strange mistake altered an established conclusion.	6.47	6.05	5.76
The habitual behavior acquired a noble quality.	5.20	4.76	4.65
The stray prejudice revealed an ugly nature.	5.18	5.35	5.65
The former custom abused a moral principle.	5.41	6.20	5.71
The final decision nullified a prior commitment.	5.41	6.05	5.59
The preliminary hypothesis predicted an unstable relationship.	6.25	4.88	4.88
The latest evidence suggested an alternative version.	5.88	5.76	6.50
The current effort concluded a productive program.	5.47	5.55	5.59
The horrible fear followed a traumatic experience.	5.40	4.00	5.29
The early civilization organized a feudal system.	5.65	6.41	6.20
The impartial source identified a hidden fault.	5.76	5.50	5.24
The plain alteration introduced an essential balance.	4.45	4.41	4.83
The tentative reason supplied an adequate explanation.	5.05	5.06	5.06
The arbitrary regulation provoked a civil complaint.	4.65	4.47	5.20
The main assembly noticed an unnatural pause.	6.29	6.41	6.70
The thrifty business registered an average profit.	6.47	5.85	6.24
The careful study resolved an open question.	6.59	6.45	5.76
The passive majority defeated a listless opposition.	5.40	4.47	4.06
The vague notion survived a renewed concern.	5.05	4.88	4.76
The additional fact settled a major disagreement.	6.06	6.65	6.65
The original location fulfilled a customary requirement.	5.76	4.76	6.40
The previous calculation contributed a significant result.	6.12	5.53	6.75
The last crisis created a real necessity.	4.76	6.30	6.12
The introductory statement promised a logical treatment.	6.00	5.65	5.76
The awkward incident prevented a possible agreement.	6.06	6.45	6.24
The advanced technology obtained a respectable reputation.	5.90	5.35	5.94
The minor change modified a basic measure.	5.35	5.71	5.30