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AUTHOR Katzer, Jeffrey; And Others

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ABSTRACT

This project examines anaphora (the linguistic device of abbreviated subsequent reference to a concept) in information retrieval (IR) systems in order to develop procedures to recognize anaphors in text and distinguish between anaphoric and non-anaphoric uses of a given term, estimate the number of anaphors appearing in bibliographic records, and assess the effect on retrieval performance when anaphors are replaced by their referents. In the first phase of the study, rules were developed to form the basis for an automatic procedure to recognize anaphoric terms in bibliographic databases. An examination of the titles and abstracts of 600 documents revealed that only 3.67 true anaphors occurred in the average abstract, suggesting that the effect of treating these terms in some way to improve retrieval performance might be slight. In the second phase, 12 term weighting schemes were used to determine the relevance of each document to the corresponding query, and user's relevance judgements for the same searches were compared with the system's judgements for (1) searches using abstracts in which anaphors had been replaced with their referents, and (2) searches using abstracts with unresolved anaphors. These comparisons yielded mixed results, indicating that a straightforward substitution of referents for their anaphors will not improve retrieval performance in the majority of cases. It is concluded that future studies which treat document length more explicitly and study documents on an individual level are necessary. A bibliography is provided, and five lengthy appendices include the preliminary test and functional indexes, the retrieval experiment and functional indexes, results of the linguistic analysis, test results of rule sets, retrieval test results, and summaries of statistical results for searches of INSPEC and PsycINFO. (KM)

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# IMPACT OF ANAPHORIC RESOLUTION IN INFORMATION RETRIEVAL (INFORMATION SCIENCE)

Final Report July 1985

School of Information Studies
Syracuse University
Syracuse, New York 13244-2340

# IMPACT OF ANAPHORIC RESOLUTION
# IN INFORMATION RETRIEVAL

Final Report
October, 1986

Jeffrey Katzer
Susan Bonzi
Elizabeth Liddy

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School of Information Studies
Syracuse University
Syracuse, New York 13244

This report was written by

Jeffrey Katzer, Elizabeth Liddy and Susan Bonzi

## PROJECT STAFF

| | |
|---|---|
| Principal Investigator | Jeffrey Katzer |
| Faculty Associate | Susan Bonzi |
| Research Associate | Elizabeth Liddy |
| Graduate Assistants | Elizabeth Oddy |
| | Joseph Janes |
| Primary Consultant | Robert N. Oddy |
| Project Secretary | Margaret Montgomery |
| Additional Assistants | Laurie Hussey<br>Beth Livingston<br>Richard Miller<br>Lesley Pease<br>Keith Williams |

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# ABSTRACT

Anaphora is the linguistic device of abbreviated subsequent reference to a concept. This research project was based on the hypothesis that within document frequency (WDF) of a term, and ultimately retrieval performance of a system using WDF, would be affected by the resolution of anaphora (replacement of its anaphor with its referent) within its text of a document. In order to test the hypothesis, a two-phase investigation was implemented.

In the first phase, all potential anaphors in a random sample of 300 abstracts from each of two databases were identified. Each occurrence of anaphora was then examined in order to determine if the term actually functioned anaphorically. From these observations, patterns emerged which were then developed into rules that captured the systematic regularities of functional anaphors. The rules were tested by at least three people to determine whether the rules accurately distinguished functioning anaphors from potential anaphors.

In the second phase of the project, 24 queries, abstracts retrieved from computerized searches on the queries, and relevance judgments on each retrieved document were selected from a previous research project. All functioning anaphors within the abstracts were resolved by hand. Twelve term weighting schemes were used on the basis of determining relevance of each document to its corresponding query. Two statistical relationships were then compared: 1) between the user's relevance judgment and the system's judgment based on the unresolved abstracts, and 2) between the user's relevance judgment and the system's judgment based on the resolved abstracts. If the latter relation is stronger than the former, then a formal treatment of anaphora in bibliographic retrieval positively affects system performance.

Results of the comparisons were mixed. In some instances, the resolved documents produced a significantly better correlation between user's judgments and system's judgments, while in other instances, the opposite occurred. The findings that resolution of anaphora may increase the performance of a retrieval are far from conclusive. It is clear that future studies of anaphora in information retrieval must be treated in a more complex manner than was attempted here.

# OVERVIEW

In free-text information retrieval (IR) systems, all non-trivial words in the document are used to represent the content of that document. In the design of these systems, it is reasonable to believe that the more often a term is repeated, the more likely it is that the term represents a major concept of the document. It is for this reason that IR systems weight the importance of a given term as a function of its frequency of occurrence within the document. However, a straightforward count of each word type does not go far enough because it excludes ways in which the same concept can be represented by other words. Removing suffixes and combining synonyms are two methods that are used to make the resulting term weights better reflect the true presence of a concept in a document.

Another way in which an instance of a concept can be "hidden" in a count of term frequencies is through anaphoric reference, where, for example, a pronoun represents a major concept discussed elsewhere in the document. Though anaphora has been mentioned by several researchers in information science, very little is known about the extent of anaphora in bibliographic databases or how an explicit treatment of anaphora may change term weights and consequently retrieval performance.

This report documents the first investigation of anaphora in IR. More specifically, our objectives were to:

1. Develop procedures to recognize anaphors in text and to distinguish between anaphoric and non-anaphoric uses of a given term.

2. Estimate the number of anaphors appearing in bibliographic records.

3. Assess the affect on retrieval performance when anaphors are replaced by their referents.

These objectives are addressed in the next two sections of this report.

The first section is based on an examination of existing linguistic theory combined with a detailed study of a random sample of 600 documents (titles and abstracts). 142 words were identified as potential anaphors, though among the documents studied only 95 of these actually were present. These words were organized into ten classes and for each, rules were developed to determine whether a given term functioned anaphorically as it was used in the document. These rules can form the basis for an automatic procedure to recognize anaphoric terms in bibliographic databases. An examination of the 600 documents discovered that only 3.67 true anaphors occurred in the average abstract -- suggesting that the effect of treating these terms in some way to improve retrieval performance might be slight.

The second section of this report presents the results of our examination of the third objective. This study is based on the premise that anaphors are used by authors to avoid repetition and as such, they are likely to represent the more important concepts in a document. Therefore, replacing all anaphors with their referents will change term frequencies in such a way so as to improve retrieval performance. A post-retrieval experiment was conducted making use of 12 existing queries for each of the two bibliographic databases. All documents retrieved by these queries were examined to identify all true anaphors. Then, by hand, each of these anaphors was replaced with its word or phrase referent. This process changed the frequency of occurrence of words in the document, and therefore the predicted relevance of the retrieved documents was also changed. If the process of replacing anaphors with their referents improves retrieval performance, then the revised set of term frequencies should predict document relevance better than the original frequencies.

The results of the study are mixed. Treating anaphora does improve retrieval for several queries though all classes of anaphora do not contribute equally to this improvement. There are also instances in which retrieval performance decreases when given classes of anaphora are replaced with their referents. However, for the majority of queries there is no effect of treating anaphora in this way. The major conclusion of this work is that a straightforward substitution of anaphors for their referents will not improve retrieval performance in the majority of cases. We remain convinced, however, that the basic premise underlying this research is true, viz., that anaphors are used to abbreviate subsequent mentions of the more important concepts in a document. Therefore, the study of anaphora in IR research should not be abandoned, rather, other means of isolating the reference to key concepts need to be explored.

Two avenues of additional work are proposed. First, document length needs to be treated more explicitly. When an anaphor is replaced it often is not a one-word for one-word substitution. Instead, entire phrases may be added to the document, increasing the number of trivial terms more than the number of instances of key terms. Because ranking formulas tend to be sensitive to the total number of words in a document, retrieval performance can deteriorate after an anaphor is replaced. Another approach to limiting the increase in document length is to edit the substitution process by allowing only terms that appeared in the query to be added to the document when an anaphor is replaced. The second area of additional work is to study documents on an individual level. By focusing on retrieval performance, our level of analysis had to be the query. Replacing anaphors with their referents may affect individual documents quite differently and the overall effect on the query would be some "average" of what happened to the individual documents.

At this time, these two areas of future work seem to hold the most immediate promise for tapping the potential of using the full semantic content of anaphors to improve information retrieval effectiveness. This potential effect exists not only for document abstracts used in free-text searching, but also in other areas of information retrieval work that use naturally occurring texts such as users' queries or full-text documents in a question-answering system.

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# A Study of Discourse Anaphora in Scientific Abstracts[1]

Elizabeth Liddy, Susan Bonzi, Jeffrey Katzer & Elizabeth Oddy
School of Information Studies,
Syracuse University, Syracuse, New York 13244

## Introduction

Much of the work that information retrieval is involved in makes use of naturally occurring texts such as users' queries, abstracts in a free-text retrieval system, or full-text documents in a question-answering system. To develop successful systems in any of these areas requires an adequate handling of the whole range of linguistic phenomena that exhibit themselves in naturally occurring text. They may be word-level (morphology) or sentence-level (syntax) phenomena or they may be discourse level phenoeena which become a factor when analyzing units of text larger than a single sentence. Designers of information retrieval systees have already learned to apply linguistic knowledge developed in both morphology and syntax. For example, morphology has contributed the technique of stemming which conflates terminological variants to their stem, while the automatic identification of noun phrases for use as indexing phrases uses syntactic analysis [1]. However, information retrieval systems which manipulate chunks of connected text must also attend to the text level phenomena which have more recently come under study in discourse linguistics. Among the linguistic devices of concern at the discourse level are anaphora, cataphora, ellipsis, substitution, parallelism and inter-sentential conjunction.

[1] Based on an article accepted for publication in JASIS.

The discourse level phenomenon dealt with in this paper can be most inclusively referred to as discourse anaphora. This use of the term anaphora reflects common usage in discourse linguistics rather than that of Chomsky and linguists of the transformational grammar school who use the term 'anaphor' in a more narrowly defined sense. While Chomsky is concerned with determining the exact conditions under which pronouns function within one sentence, our concern is with all anaphoric-type references, whether within or across sentence boundaries. Discourse anaphora can be defined as abbreviated subsequent reference and is most commonly exemplified by, but not limited to, the use of pronouns. Examples of discourse anaphora can be seen in the following excerpt where the term "counteridentification" is actually used only once, but the concept is semantically present a total of three times since it is anaphorically referred to twice more, once by "this mechanism" and once by "it".

> Counteridentification is a mechanism that makes changes within the psychic structure of the individual. This mechanism differs from negative identification in that it uses the aggressive energies....

Humans (e.g. indexers, or users judging document relevance) mentally resolve anaphoric references and appear able to take abbreviated references into consideration in constructing appropriate mental representations of text. This is facilitated by the fact that in expository texts a new entity (a concept or object) is usually introduced to the reader in its fullest, most explicated form. A possible syntax for such a noun phrase is:

$$\text{det} + \text{adj}_1 + \ldots\ \text{adj}_n + \text{noun} + \text{prep phrase/rel clause}$$

Full first-mention is used in order to firmly establish a virtual instance of the entity in the mind of the reader. Having successfully anchored the lexical realization to a mental representation, further comments can be made about that entity without repeating all the pre- and post-modifiers used in the first-mention realization form, or even without using the noun itself.

The range of possible subsequent-mention realization forms which would be considered anaphoric references, include:

- determiner + same noun
- determiner + general noun
- pronoun

All of these subsequent-mention forms are shorter and convey less information than full first-mentions. However, these forms do communicate successfully and unambiguously to a reader because all the text need do is remind the reader which entity is being mentioned, rather than create a new mental representation.

Although humans seldom encounter difficulty in recognizing an anaphor and correctly identifying the referent of the anaphoric expression in text, discourse anaphora remains one of the text level phenomena still posing substantial difficulties for the many fields that are attempting to make use of naturally occurring texts. In information science, the necessity for recognizing and resolving anaphoric references impacts on 1) natural language understanding, 2) question-answering, 3) automatic extracting, 4) query analysis, and 5) bibliographic retrieval.

Natural Language Understanding: A natural language understanding system needs to build a semantic representation of the text being processed. In order to do this successfully, the difficult task is not in accurately representing the meaning of each new input sentence singly, but rather in appropriately combining the meaning of all individual sentences to form a representation of the aggregated meaning of the text. It is a matter of interpreting new information in light of the old and of connecting new information to the appropriate old information in the representation, so that a coherent whole results. It is not unexpected, then, that the task of correctly interpreting discourse anaphora is essential for building integrated representations of meaning for natural language understanding systems [2].

Question-Answering: Question-answering systems may be of two types, both of which require handling of discourse anaphora. One approach to question-answering systems is to build semantic representations of both the texts in the system and the users' queries and use the latter representations to find appropriate answers among the former. If this is the approach taken, the rationale given above for anaphora resolution techniques in N.L.U. holds for this task as well. An alternative approach to question-answering has been attempted by John O'Connor [3]. O'Connor attempted to provide answers to queries by retrieving answer-providing passages from the actual text of the document rather than building an intermediate semantic representation of the text. His results were very promising, but O'Connor suggested that further improvement could be gained if it were possible to locate in text the fully explicated expressions which are subsequently referred to in an abbreviated manner by anaphoric clues such as 'this', 'these' and 'those'.

Automatic Extracting: Paice's work [4] on automatic extracting clearly recognized the need for attending to anaphoric reference in text. In order to automatically compile a comprehensible, substantive extract, Paice found it necessary to establish a list of 'clue words' (e.g. 'it', 'them', 'similar', 'both') which indicated that if the particular sentence in which these words occurred was to be included in the extract, it would be necessary to locate and include the earlier text in which these anaphoric references were more fully explicated.

Query Analysis: Research currently underway by Oddy [5] (see also Belkin, Oddy, Brooks [6]) into an information seeker's state of knowledge on the topic or problem which compelled their interaction with the information retrieval system, includes techniques for analyzing and representing relationships between concepts in the user's problem statement. These relationships are currently computed from quite superficial, mainly statistical, characteristics of the texts. Also, the texts are transcripts of oral utterances with copious use of anaphora. Hence, resolution of discourse anaphora would undoubtedly affect the derived representation of the user's state of knowledge.

Bibliographic Retrieval: In free-text document retrieval systems, the problem of correctly recognizing and resolving subsequent references is important because many of the statistical methods of determining which documents are to be retrieved in response to a query make use of frequency counts of terms. For this count to be a true measure of semantic frequencies, it would appear that the semantically reduced subsequent references should be resolved by their earlier, more fully specified referents in text. A technique in many experimental and a few operational document retrieval systems is to weight the terms of a document's free-text representation (title and abstract) on the basis of term frequencies. The information retrieval system, applying a similarity measure between query and document representations, will then do a best-match search, retrieval, and ranking of documents for the user. This technique is based on two apparent assumptions: 1) that frequency of occurrence is a good indication of the degree to which a piece of text is about a certain term, and 2) that an adequate means of determining semantic frequency of a concept is by counting all explicit occurrences of a term.

However, the theory behind discourse anaphora predicts that an adequate measure of frequency of occurrence of a concept requires that all implicit occurrences of that term be taken into account. In bibliographic retrieval, this would mean that the frequency count of document terms after resolution of all anaphors would better represent what the document is about and that resolving anaphoric terms in abstracts would significantly improve retrieval results by obtaining for the user a ranked ordering of documents more truly reflective of the documents' degree of relevance to the user's query.

Even though the areas of work in information science discussed above need to be concerned with discourse anaphora, no study exists which provides either 1) base-line quantitative data on the extent to which this phenomenon exists in a text-type used in information science, or 2) insight into whether the use of anaphoric references in such a text type is rule-governed enough to permit development of algorithms for automatically detecting and then resolving anaphoric references. In fact, a recently published investigation by Fidel [7] of those aspects of free-text which might impact on retrieval, mentioned no concern about anaphoric references. It is hoped that the benchmark descriptive data and feasibility of automatic recognition and resolution of anaphora provided by this study may be useful to those areas of work on which the presence of anaphoric terms has an impact.

## Study

Our work consisted of detecting occurrences of anaphoric references and computing base-line counts, as well as developing rules which would capture in algorithmic form the decisions made by human processors both as to whether a term is anaphoric or not and to what is its proper referrent. Before these tasks could be attempted, however, some preliminary steps were required.

The first task was to develop a list of all those terms considered potentially anaphoric. Having located no such preestablished, all-inclusive list in the literature, we compiled a list from grammar books, particularly Quirk, Greenbaum, Leech & Svartik [8], linguistic works dealing with linguistic devices adding to the cohesion of a text, such as Halliday & Hasan [9], and Grimes [10], and prior investigations into some subset of the phenomena of discourse anaphora (Webber, [11], Sidner, [12], and Hirst, [2]). This resulted in the set of 142 potential anaphors (P.A.s). listed in (Figure 1).

#above
#additional
aforementioned
aforesaid
#all
#another
another's
#any
anybody
#anyone
#anything
#both
#did
#do
#does
#doing
#done
#each
eighth
#either
#else
else's
elses'
#enough
#equal
#every
everybody
everyone
everyone's
everything
#few
#fewer
fewest
#fifth
#first
forementioned
#former
former's
#fourth
#he
#her
#here
hers
#herself
#him
#himself
#his
#I

#identical
#identically
#it
#its
#itself
#last
#latter
latter's
#least
#less
likewise
#little
#many
me
mine
#more
#most
#much
my
myself
#neither
#ninth
#no
nobody
#none
#nothing
#one
#one's
ones
#ones'
#other
other's
#others
#our
ours
ourselves
#S
#S's
#Ss
#Ss'
#same
#second
seventh
#several
#she
#similarly
#sixth
#so

#some
somebody
somebody's
someone
someone's
#something
#such
tenth
#that
#the
#their
theirs
#them
#themselves
#then
#there
thereat
therefor
therefrom
#therein
thereinto
thereof
thereon
thereout
thereto
thereunder
therewith
#these
#they
#third
#this
#those
#thus
#us
#vice versa
#we
#where
#which
#who
#whom
#whose
you
#your
yours
yourself
yourselves

Figure 1

A classification scheme (Figure 2) was then imposed on these

P.A.s so that work could proceed at the class or sub-class level. The class distinctions were made on a functional basis guided by the intuition gained from a small feasibility study which investigated whether recognition and resolution techniques would be generalizable at the functional class level.

1. Central Pronouns
    a. Personal Pronouns - he, him, it
    b. Possessive Pronouns - his, her, their
    c. Reflexive Pronouns - itself, themselves
2. Nominal Demonstratives - this, these, those
3. Relative Pronouns - who, which, where
4. Nominal Substitutes - above, former, one
5. Pro-verb - do
6. Indefinite Pronouns - any, each, many
7. Pro-adjectives - another, identical
8. Pro-adverbials - so, such, similarly
9. Subject References - S, Ss
10. Definite Article - the

Figure 2: Classes of Discourse Anaphora with examples

Most of the terms which are capable of anaphoric reference can also perform other functions in text and as a result should be considered as only potential anaphors (P.A.s). Any system which adequately handles subsequent reference in text first needs a means for determining in a particular instance if a P.A. is actually a functioning anaphor (F.A.). Although most humans can quite easily decide in a specific instance whether a term is being used anaphorically or not, the precise linguistic evidence on which these decisions are made is not available in the literature and needs to be delineated, so that algorithms can be written for accomplishing the same task. Therefore, we conducted a study to see whether it would be possible to develop rules which could be successfully applied by independent judges and result in a clear separation between those instances where a P.A. is simply a P.A. and those instances where a P.A. is an F.A. Success with these rules would suggest the feasibility of developing machine-implementable algorithms to make the same distinctions.

To write such algorithms, it is necessary to look at a corpus sufficiently large that the regularities of syntax and lexical choice which would serve as the basis of these rule-based algorithms will exhibit themselves. Unfortunately, much of the previous work in linguistics on anaphora has used contrived texts or corpuses too small to generalize from. So, for a corpus on which to write and test rules for recognizing when a P.A. is an F.A., we drew 600 abstracts at random, 300 each from two operational document retrieval databases: 1) PsycINFO - which contains abstracts of documents reporting on the behavioral sciences, and 2) INSPEC - which contains abstracts of documents reporting on engineering and computer science. This combined set contained occurrences of 95 P.A.s (starred terms in Figure 1) from the preliminary compilation of 142 P.A.s. These 95 terms, on which the following work is based, were assigned to one of the 10 classes of anaphoric terms (see Figure 2).

The basic procedure which was followed in developing and testing the P.A.-to-F.A. rules is outlined as follows:

1. For each class, all abstracts containing occurrences of terms of that class were collected. The exact number of abstracts drawn for each class correlated roughly with the frequency with which terms of that class occurred.
2. For each occurrence of a P.A., an intellectual decision was made as to whether the P.A. was an F.A.. This provided the basic summary data being reported here.
3. While doing the above step, patterns began to emerge from the texts: the predictability of contextual information in determining whether the use of the term was anaphoric or nonanaphoric became evident.
4. From these observations, P.A.-to-F.A. rules were written which capture the systematic regularities which, when encoded in algorithms, will, we hope, replace human intuitive decision making. These regularities are either in the lexical environment in which anaphoric/nonanaphoric use of a term can be predicted to occur, or the particular syntactic construction indicating anaphoric /nonanaphoric use.[2]
5. The P.A.-to-F.A. rule sets for each class, sub-class, or term were slightly reworded where necessary using a less linguistically oriented vocabulary. Each rule set was given to at least three judges who applied them to a subset of the original 600 abstracts. Each rule was tested on ten

[2] Rules have not as yet been developed for class 10, the definite article, due to the unpredictability of the contexts in which 'the' appears. Following analysis of the results of the retrieval experiment, rules will be attempted if the results warrant algorithm development for this class.

different occurrences of the term(s) to which the rule applied. If there were less than 10 occcurrences, all of the available occurrences were tested.

## Results

The results reported here are of a twofold nature: 1) summary data on distribution of P.A.s and F.A.s in abstracts; and 2) success of writing rules for use in determining whether a P.A. is an F.A.

### Distributional Analysis

The summary data indicates that the linguistic phenomenon of discourse anaphora exhibits itself to a greater extent in PsycINFO than in INSPEC.

Table 1 shows the mean occurrence of P.A.s per abstract to be 13.2 for the PsycINFO abstracts, and 10.08 for the INSPEC abstracts, with a mean occurrence of 11.64 P.A.s per abstract across the complete sample of 600 abstracts. The mean occurrence of F.A.s per abstract is 4.49 for the PsycINFO abstracts, and 2.86 for the INSPEC abstracts, with a mean occurrence of 3.67 F.A.s per abstract across the complete sample of 600 abstracts. These preliminary results suggest that the phenomenon of discourse anaphora has a greater impact on a natural language text-handling systems in the behavioral sciences as compared to computer science and engineering.

These results might appear to suggest that since there are far fewer F.A.s than P.A.s, the effects of resolving F.A.s may not be as large as a casual study of P.A.s would indicate. It should be noted, however, that since discourse anaphors are used by the writer to avoid needless repetition, anaphors are more likely to be used to replace the major concepts in a piece of text. As a result, resolving even the mean of 3.67 F.A.s per abstract may have a strongly differential impact on term frequencies and ultimately, retrieval results. Also, since most pieces of text are organized around one or two major concepts, the effect of leaving anaphoric references untreated has the same potential for substantive impact on any of the information science areas which deal with naturally occurring texts.

Table 1: Distribution across 2 Subject Domains

| | P.A.s | | F.A.s | |
|---|---|---|---|---|
| | No. | Mean | No. | Mean |
| PsycINFO | 3960 | 13.2 | 1347 | 4.49 |
| INSPEC | 3024 | 10.08 | 857 | 2.86 |
| | ---- | ----- | ---- | ---- |
| Total | 6984 | 11.64 | 2204 | 3.67 |

A Functional Index (F.I.=#F.A/#P.A.) was computed for each class in each database (Table 2). Appendix A contains this information for each individual term in the set of 600 abstracts and Appendix B, figures for the 487 documents used in the retrieval experiment. The F.I. is an important parameter of consideration as we are interested in developing resolution algorithms for those classes in which a high proportion of the

P.A.s are F.A.s. Given only the information in Table 2, some classes appear far likelier candidates than others. For example, of the 493 uses of central pronouns, 78% of the occurrences were anaphoric. This high F.I. contrasts with the use of the definite article 'the' which has a very high frequency of occurrence (3435 uses across both databases) yet an F.I. of only 14%. On this basis, it would be unlikely that one would choose to devote one's efforts to developing algorithms for classes with so low an F.I.. Yet the results of the retrieval experiment will also be taken into consideration when choosing classes for algorithm development. It makes sense to concentrate our efforts on those classes with both a high F.I. and demonstrated positive effect on retrieval performance.

## Rule-Governed Recognition of Functional Anaphors

The other area of results to be reported is that of the extent to which the rules for deciding when a P.A. is an F.A. can successfully be applied by independent judges. These results provide preliminary evidence of whether the environment in which an anaphoric usage occurs is predictable enough to make automatic recognition possible. Three judges were used for testing each set of rules. The judges were not aware that their decisions were on the anaphoricity of a term. They were instructed to follow a set of rules which described distinct patterns of usage of a term and decide which pattern a particular instance matched. The rules used by the judges were based on the linguistic regularities observed and captured in individual analyses of each functioning anaphoric term and are contained in Appendix C.

Table 2: Class Summary

| | PsycINFO | | | INSPEC | | | Totals | | |
|---|---|---|---|---|---|---|---|---|---|
| | Ana. | Non. | F.I. | Ana. | Non. | F.I. | Ana. | Non. | F.I. |
| Central Pronouns | 244 | 60 | .80 | 143 | 46 | .76 | 387 | 106 | .78 |
| Nominal Demonstratives | 176 | 265 | .40 | 155 | 148 | .51 | 331 | 413 | .44 |
| Relative Pronouns | 227 | 255 | .47 | 192 | 88 | .69 | 419 | 343 | .55 |
| Nominal Substitutes | 60 | 63 | .49 | 64 | 71 | .47 | 124 | 134 | .48 |
| Pro-verb | 21 | 42 | .33 | 3 | 12 | .20 | 24 | 54 | .31 |
| Indefinites | 128 | 317 | .29 | 44 | 209 | .17 | 172 | 526 | .25 |
| Pro-adjectives | 27 | 51 | .35 | 10 | 40 | .20 | 37 | 91 | .29 |
| Pro-adverbials | 25 | 52 | .32 | 30 | 68 | .31 | 55 | 120 | .31 |
| S & Ss | 188 | 25 | .88 | 0 | 0 | - | 188 | 25 | .88 |
| Definite Article | 251 | 1483 | .14 | 216 | 1485 | .13 | 467 | 2968 | .14 |
| Totals | 1347 | 2613 | .34 | 857 | 2167 | .28 | 2204 | 4780 | .32 |

The rule sets consisted of an ordered series of pattern matching tasks against either syntactic or lexical templates. Judges decide whether a usage matches Rule 1, or Rule 2, and so on, down the list of rules for that class or term. Some of these rules define anaphoric uses, others nonanaphoric, but the judge was not concerned with this. The judges' decisions were strictly governed by the pattern matching aspect of the rules. These are the types of human decisions that algorithms are able to mimic and which will make the automatic recognition of anaphoric uses of terms possible. The eventual automation of this task would require, in addition to the algorithms, the inclusion of two components commonly avaliable in text processing systems, namely, a parser and a lexicon with semantic class information. (See [13] for a sample set of rules for the Nominal Demonstrative 'that'.)

Table 3 presents the average rate for classes 1-9, across three judges, of correctly applying the rules for deciding which pattern of usage a particular instance of a term follows. Appendix D contains the success rate of applying rules for each judge and cumulatively for each term tested. The success of the pattern-matching rules in correctly predicting the same decision as an overt intellectual decision on a term's anaphoricity ranged from a low of 83% for the terms comprising the S & Ss class to a high of 99% for the proverb 'do'. These initial results give us confidence in the field's ability to develop P.A.-to-F.A. algorithms, particularly since an error analysis has identified the recurring problem with the rules to be a difficulty in deciding when a subsequent definite noun phrase containing a class level noun refers to the same entity as a previous specific noun (e.g. 'the instrument' uses the P.A. 'the' plus a class level noun used as a less specified reference to a particular test instrument mentioned earlier in text). Inclusion of semantic class information in the system's lexicon could easily lessen the number of errors of this sort.

## Discussion

With a mean occurrence of 3.67 functioning anaphors per abstract across the full sample of 600 abstracts, this study indicates that terms capable of anaphoric reference occur suffi-

Table 3: Testing of Rules

| | |
|---|---|
| 1. Central Pronouns | 98% |
| 2. Nominal Demonstratives | 87% |
| 3. Relative Pronouns | 93% |
| 4. Nominal Substitutes | 88% |
| 5. Pro-Verb | 99% |
| 6. Indefinites | 89% |
| 7. Pro-adjectives | 86% |
| 8. Pro-adverbials | 96% |
| 9. S & Ss | 83% |

ciently frequently in abstracts, to raise questions as to the adequacy of techniques which use surface counts of a term as a sufficient measure of the total times that a concept is referred to in an abstract. In that anaphors tend to be used for shortening the reference to the major concepts of a text, it is intuitively clear, although awaiting empirical proof, that resolution of these anaphoric references will generate term frequencies which provide better representations of the information content of documents and improve retrieval in an operational setting. These representations will be based on the frequency of reference to a concept rather than the currently used frequency of occurrence of a term.

In the second phase of this research project, we conducted an experiment on the impact of resolving anaphors in one area of information science, namely bibliographic retrieval, but consider the effect to be more far ranging than just retrieval, especially since the numbers of F.A.s is a function of the length of the text. Any work with naturally occurring text is affected by the linguistic phenomenon of discourse anaphora. As noted above, work in the areas of question-answering, automatic extracting, and query analysis have acknowledged the need to develop techniques for handling anaphoric terms. We are hopeful that our results will provide some previously unavailable base-line data on discourse anaphora in one particular text-type across two subject domains.

Results of the rule testing indicate that algorithms for determining automatically whether a potentially anaphoric term is functioning as an anaphor in a particular instance are indeed feasible since the task has been shown to be one of pattern matching governed by rules applied with high reliability. In addition, a similar algorithmic approach for resolving functioning anaphors with their appropriate referrents will be suggested for several of the classes of anaphors after a full analysis of the retrieval experiment results is completed.

## References

1. Waldstein, R. The Role of Noun Phrases as Content Indicators. Ph.D. Dissertation, Syracuse University School of Information Studies, 1981.

2. Hirst, G. Anaphora in Natural Language Understanding: A Survey. New York: Springer-Verlag: 1981.

3. O'Connor, J. "Text Searching Retrieval of Answer-Sentences and Other Answer-Passages." Journal of the American Society for Information Science. 24(6): 445-460: 1973.

4. Paice, C. D. "The Automatic Generation of Literature Abstracts: An Approach Based on the Identification of Self-Indicating Phrases." In: Oddy, R.N., ed. Information Retrieval Research. London: Butterworths: 1981: 172-191.

5. Oddy, R.N. A Study of Representations for Anomalous States of Knowledge in Information Retrieval. NSF Grant Proposal IST-8420608. Syracuse, New York: Syracuse University School of Information Studies: 1984.

6. Belkin, N.J.; Oddy, R.N.; Brooks, H.M. "ASK for Information Retrieval: Part I. Background and Theory. Part II. Results of a Design Study." Journal of Documentation. 38 (2,3): 61-71, 145-164: 1982.

7. Fidel, R. "Writing Abstracts for Free-Text Searching." Journal of the American Society for Information Science. 42(1): 11-21: 1986.

8. Quirk, R.; Greenbaum, S.; Leech, G.; Svartik, J. A Grammar of Contemporary English. London: Longmans: 1972.

9. Halliday, M.A.K.; Hasan, R. Cohesion in English. London: Longmans: 1976.

10. Grimes, J. The Thread of Discourse. The Hague: Mouton Publishers: 1975.

11. Webber, B.L. A Formal Approach to Discourse Anaphora. New York: Garland Publishing, Inc.; 1979.

12. Sidner, C. Towards a Computational Theory of Definite Anaphora Comprehension in English Discourse. Artificial Intelligence Laboratory Report TR-537: Cambridge, Massachusetts: Massachusetts Institute of Technology: 1979.

13. Liddy, E.; Bonzi, S.; Katzer, J.; Oddy, E. "A Study of Discourse Anaphora in Scientific Abstracts." Journal of the American Society for Information Science. (In press).

# THE EFFECTS OF ANAPHORIC RESOLUTION ON RETRIEVAL PERFORMANCE [1]

Jeffrey Katzer, Susan Bonzi, Elizabeth Liddy

Syracuse University, School of Information Studies
Syracuse, New York 13244

## INTRODUCTION

For almost thirty years, work in automatic indexing has been a major component of information retrieval research. To perform effectively, indexing schemes must be able to accurately portray what the document is about and they must assist in the discrimination among documents in the collection. Within document frequency (WDF) is clearly helpful in meeting the first of these functions: the more often a term is used in a document, the greater the likelihood that the concept or subject underlying the term is central to the document. However, it is not clear that WDF is of much value to the second function of indexing schemes. For a term to distinguish among documents, its WDF must have a large variance over the collection. Given that documents are composed of relatively few words, such as titles and abstracts, coupled with the rather mechanical means for automatically recognizing a given term (e.g. counts of synonyms are usually not combined), it is doubtful that any sizable variance in WDF would occur. Some support for this contention is provided by Sparck Jones [2] who found that 62% of the terms in one small database had a WDF of one and another 19% of the terms had a WDF of two.

There is little evidence of the effect of increasing the variation of WDF on retrieval performance. It is not enough to simply increase the WDF weights. To be of value in retrieval the increase must be disproportional, raising the variability by affecting key terms more than other terms. Using longer documents (full text instead of abstracts) is one method to accomplish this. Another is to bring together into one class, all mentions of a single concept -- whether referred to by the same root, by a synonym, or by the linguistic technique known as anaphora. Stemming of suffixes is common to most approaches to automatic indexing and thesauri have been used to combine synonyms into a single class. However, the effect of anaphcra on WDF and ultimately on retrieval performance has not been studied.

## ANAPHORA

Anaphora, briefly defined, is the linguistic device of abbreviated subsequent reference. Consider the following sentence [3]:

Wash and core six baking apples and place them in a pan.

The pronoun, "them" is an anaphor and is easily understood by people to mean, "six washed and cored baking apples".

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1. This report is based on a paper presented at the 1986 ASIS Annual Meeting, Chicago, Illinois.

Anaphora is one of several so-called cohesion devices used in both written and spoken discourse to (1) avoid monotonous repetition, (2) shorten the discourse, and (3) enhance the coherence of the passage. Because anaphors are used to eliminate repetitiousness, they are more likely to be used to replace the major concepts and terms in an abstract. Thus, we would expect that resolving all anaphors in an abstract will increase the WDF of important terms proportionally more than it will raise the frequencies of other terms.

Although human intellect has no difficulty recognizing and resolving anaphors (replacing them with their referents), automatic methods to accomplish these tasks are still in their infancy. Work in natural language understanding has made some advances in the treatment of anaphora, but that work is restricted to limited subject domains or certain classes of anaphora. [4-10] In information science, anaphora is almost completely ignored. There is some mention of it in the literature [11-14], but not in terms of document retrieval. Instead, anaphora is considered in the treatment of question-answering systems, passage retrieval, or automatic abstracting.

Table 1 presents the major classes of anaphora used in the current study; see [15] for a more complete description. Whether or not a given anaphor actually functions anaphorically can only be determined by analyzing the linguistic context within which the term exists. Thus, the

## TABLE 1

## CLASSES OF ANAPHORA

| | ANAPHORIC CLASS | EXAMPLES |
|---|---|---|
| A: | CENTRAL PRONOUNS | they, their, themselves |
| B: | NOMINAL DEMONSTRATIVES | this, that, these, those |
| C: | RELATIVE PRONOUNS | who, which, where |
| D: | NOMINAL SUBSTITUTES | above, former, one |
| E: | PRO-VERBS | do |
| F: | INDEFINITES | some, all, each |
| G: | ADJECTIVES | another, both, identical |
| H: | ADVERBS | so, such, similarly |
| I: | SS | (subjects) |
| J: | DEFINITE ARTICLE | the |

resolution task depends upon (1) an exhaustive list of all potential anaphors, (2) a set of rules to determine if a particular potential anaphor is actually functioning anaphorically, and (3) a set of rules for replacing the functioning anaphors with their referents.

## METHOD

In this study, retrieval performance depends upon the degree to which the predicted relevance of "unresolved" and "resolved" documents matches the user's relevance judgments. Thus, three sets of judgments are needed: (1) those based on the user's assessment of documents retrieved by an IR system in response to a query, (2) those produced by the retrieval system from unresolved stems in the document, and (3) those produced by the system from the resolved stems in the document.

Databases, Queries, & Relevance Judgments: Since the three relevance judgments noted above can be produced in a post-retrieval experiment, queries and relevance judgments collected in other studies could be re-analyzed for our current work on anaphora. Only a brief description of these existing materials will be provided here: a fuller accounting can be found elsewhere. [16]

Two databases were used to increase the generality of the findings. Each was composed of approximately 12,000 documents consisting of a citation and an abstract of 75-175 English words. From the earlier study, we had 84 queries to the INSPEC database and 57 queries to PsycINFO. All queries were posed by individuals with genuine information needs and were searched by trained intermediaries. The relevance of the retrieved documents was determined by the originator of the query using a four-point categorical scale: 1 being highly relevant, 2 slightly relevant, 3 slightly non-relevant, and 4 highly non-relevant.

The current research could make use of only a small subset of the available queries. Some queries had to be excluded because there was insufficient variability in the relevance judgments assigned to the retrieved documents. Others were excluded to decrease the amount of work involved in identifying and resolving "by hand" all anaphors in all retrieved documents. Queries were selected which met the following criteria: (a) the number of retrieved documents ranged between 15-30, (b) there were at least two retrieved documents judged at each of the four relevance categories, and (c) no more than 60% of the retrieved documents were judged relevant -- in categories 1 or 2. These criteria selected 12 queries from INSPEC and 17 from PsycINFO. Five queries were randomly discarded from PsycINFO to make the two sets equal. Table 2 describes these two test collections.

## TABLE 2

## DATABASE POPULATIONS AND SAMPLES

| | INSPEC | PsycINFO |
|---|---|---|
| AVAILABLE DATA | | |
| NUMBER OF DOCUMENTS | 12,864 | 11,662 |
| NUMBER OF USER QUERIES | 84 | 52 |
| NUMBER OF TYPES IN DATABASE | 67,401 | 35,758 |
| SAMPLE USED | | |
| NUMBER OF QUERIES | 12 | 12 |
| DOCUMENTS RETRIEVED BY EACH QUERY | 12 | 15-25 |
| UNIQUE DOCUMENTS IN ALL QUERIES | 261 | 226 |

Predicted Relevance from Resolved and Unresolved Documents: For each of the 487 retrieved documents all potential anaphors were identified by comparing each term in the file of documents with a "dictionary" of all anaphors that occurred in the two databases. Over 6500 potential anaphors were found. Each of them was inspected within its linguistic context to determine if it actually functioned anaphorically in the document; over 2200 true anaphors were identified. The final step was to apply another set of rules to resolve all functioning anaphors. The dictionary of anaphors and the rules to discriminate between potential and functional anaphors were developed and validated on other document samples from the two databases. [15] At this point, two collections of the 487 documents existed: one as originally contained in the database and one with all anaphors replaced with their referents.

Term-weighting Schemes and Similarity Measures: Different methods for weighting terms and for determining the degree of similarity between documents and the query affect retrieval performance differently. [17] Therefore, it was important to consider alternative approaches to term-weighting and similarity. Table 3 lists the 12 term-weighting schemes employed in the study. Most of these include WDF -- either alone, corrected for length, or in combination with collection frequencies. Collection frequencies and term postings were tabulated separately using slightly different methods of processing; for

## TABLE 3

## TERM-WEIGHTING SCHEMES

| | | | |
|---|---|---|---|
| (a) | 1 | (g) | f/log(k) |
| (b) | 1/t | (h) | f/F |
| (c) | 1/log(t) | (j) | f/log(F) |
| (d) | f | (l) | f/[(k)(F)] |
| (e | log(f) | (m) | f/[log(k)(F)] |
| (f) | f/(k) | (n) | [f][log(N/d)] |

d = number of postings of term;
f = within document frequency;
F = frequency of term in database;
k = number of tokens in document;
N = number of documents in database;
t = number of types in document.

approximately eight percent of the terms, the number of postings was higher than the collection frequency. These differences prevented our use of any term-weight that combined with postings and collection frequencies. WDF, however, was not affected by these differences. The cosine correlation and Dice's coefficient were the two similarity measures used. Combining the term weights with the similarity measures yielded 19 different pairs. *

Analysis: The major research question can be answered by comparing two statistical relationships: (1) that between the users' relevance judgments and system's relevance based on unresolved anaphora, and (2) that between the users' judgments and the system's relevance based on resolved anaphora. If the second relationship is stronger than the first, it may be reasonable to conclude that resolving anaphora in a document will affect WDFs in such a way so as to improve retrieval performance.

There are thousands of relationships to be compared. Each combination of term-weighting scheme and similarity measure was used separately on each of the ten classes of anaphora (see Table 1) and on an "eleventh" class, made up of the union of the other ten. This entire set of analyses was carried out for all queries in the two databses. Each relationship was quantified using Pearson's well-known

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* With the Cosine Correlation, term weights b and c are equivalent to a; f and g are equivalent to d; and L is the same as H.

measure of linear correlation. The two correlations (between the users' judgments versus resolved documents and users' judgments versus unresolved documents) were compared to see if one is statistically higher than the other. The analysis plan is summarized in Table 4.

RESULTS

Clearly, with over 5000 combinations of results to consider, it is difficult to draw simple conclusions. Moreover, care must be taken in interpreting individual findings because statistically some 250 tests (of differences between the two correlations) could achieve significance at the .05 level by chance alone. Therefore, the general patterns of results shown in Table 5 and on Appendix F will be examined rather than the raw findings given in Appendix E.

In general, the results are mixed. For the majority of queries, replacing anaphors with their referents did not have any real (non-chance) effect on the predicted order of document relevance.

Some resolutions had a negative effect, i.e. resolving anaphors <u>reduced</u> the retrieval performance in terms of ranking. The most obvious example of this is INSPEC Query #109 which had negative results in four different classes of anaphora. The most likely explanation for negative findings may be document length. Resolving anaphors does not simply

## TABLE 4

## ANALYSIS

For a given query, TW, and SM, do

### UNRESOLVED RANKINGS

1. Rank documents by predicted relevance
2. Correlate these with user's relevance

### RESOLVED RANKINGS

3. Resolve a single class of anaphors in all documents
4. Recompute TWs and SMs
5. Rank documents by predicted relevance
6. Correlate these with user's relevance

### COMPARE #2 vs. #6

7. Determine which set of rankings better match the user's judgments

### REPEAT ALL OF THE ABOVE FOR

A. All combinations of TWs and SMs (19)
B. All classes of anaphora and a combined class (11)
C. All queries (12)
D. All databases (2)

replace a single work (such as a pronoun) with another simple word (such as the noun to which the pronoun refers). Instead, anaphors may need to be resolved with phrases of several words -- most of which can be trivial. Since some of the term-weighting schemes and the similarity measures were not corrected for document length, resolution could, in these cases, have had a negative effect.

However, it is also evident from Table 5 that resolution increased retrieval performance for several queries -- #158, #180, #203, and #212 seem most obvious. It is worth noting that positive effects for several anaphoric classes do not necessarily accumulate into an overall positive effect when all classes are resolved (Class R): for #158 there isn't any overall effect, while for #212 the overall effect is mixed. There is no clear pattern of what is required to obtain a positive result in Class R -- compare query #107 with #170, or #221 with #222. Obviously, total resolution (Class R) is a complex phenomenon, one aspect of which is likely to be document length.

Looking at the other classes of anaphora reveals little because, in general, few clear patterns emerge. Only two classes produced consistent positive results in both databases: the nominal substitutes (D) and the adverbs (H). No class of anaphora produced comparable negative findings. For the central pronouns (Class A), the differences are between the two databases. Engineers do not seem to use these pronouns as often or in the same manner as do writers in the social/behavioral sciences. For INSPEC, not a single query was affected, positively or negatively, by resolving these pronouns. Whereas for PsycINFO, three queries profited from the resolution of pronouns and none were adversely affected by it.

There are other differences among the databases. Appendices E and F shows that PsycINFO had twice as many positive findings as INSPEC, but both had approximately the same number of negative findings. In Table 5, we can see differences in terms of queries. Though tha 12 queries from each database were selected carefully, three from INSPEC (#142, #182, #184), but only one from PsycINFO (#223) had no significant results in any anaphoric class. These differences between the databases are probably real and reflect real differences in the writing style of each field and the nature of its vocabulary.

In summary, the results indicate that a <u>direct</u> substitution of anaphors with their referents is not likely to improve retrieval performance of scientific abstracts. Instead, if anaphora is to be useful in retrieval effectiveness, it will have to be treated in some more complex manner than was attempted here. Some obvious treatments are discussed below.

## TABLE 5

## SUMMARY OF STATISTICAL RESULTS*

### ANAPHORIC CLASS

| INSPEC QUERIES | A | B | C | D | E | F | G | H | I | J | R |
|---|---|---|---|---|---|---|---|---|---|---|---|
| I-101 | | | | | | | | | | - | |
| I-103 | | | + | | | | | | | - | |
| I-104 | | | | | | | | | | - | |
| I-107 | | | | | | | | | | + | + |
| I-109 | | - | | | - | - | - | | | | |
| I-135 | | | | | | - | | | | | |
| I-142 | | | | | | | | | | | |
| I-158 | | | | + | + | + | + | + | + | | |
| I-170 | | - | | | | | | | | + | - |
| I-180 | | | | + | + | + | | + | + | | + |
| I-182 | | | | | | | | | | | |
| I-184 | | | | | | | | | | | |

, , , , , , , , , , , , , , , , , , , , , , , , , , ,

| PsycINFO Queries | A | B | C | D | E | F | G | H | I | J | R |
|---|---|---|---|---|---|---|---|---|---|---|---|
| P-203 | | | + | | | | | | + | + | + |
| P-207 | + | | | | | | | | | | |
| P-212 | + | + | + | + | | | + | + | | +/- | +/- |
| P-219 | | | + | + | | | | | | | |
| P-221 | + | | | | | | | | - | | + |
| P-222 | | | | | | | | | | - | - |
| P-223 | | | | | | | | | | | |
| P-227 | | | | | | | | + | | | |
| P-230 | | - | - | | | | | | | | |
| P-235 | | + | | | | | | + | | | |
| P-248 | | + | | | - | | | + | | | |
| P-252 | | | - | | + | + | | | | + | - |

*Sign indicates presence of at least one finding that resolution significantly affected (positively or negatively) retrieval performance.

DISCUSSION

This study was based on what still seems to be a plausible in a document and therefore, by replacing ther with their referents the WDF of important terms will be raised differentially in comparison with less important terms. Though we are pleased to find some results which support that hypothesis, we have not, as yet, been able to explain why no change was found in the majority of queries studied. Nor have we been able to determine why, for some of the queries, the results were counter to the hypothesis.

Document length is one interesting possibility for the anomalous results. Abstracts, as relatively short documents, may contain too few anaphors to effect a sizable change in WDF after resolution -- there is only an average of 4.5 anaphors in PsycINFO and 2.9 anaphors in INSPEC. Perhaps the resolution of anaphora will prove more effective on longer documents such as those found in full-text systems. Furthermore, as noted earlier, the resolution process frequently increases the length of the document -- often with non-substantive terms. These factors, combined with the sensitivity of the ranking methods to document length, may account for many of the results which ran counter to our hypothesis.

To explore the effect of document length, two further analyses can be conducted with the existing data. First, other ranking methods can be tried, ones not based on term weighting schemes or similarity measures that are sensitive to the number of tokens in the document. Second, resolutions can be automatically compared with query terms to ensure that only substantive terms are added to the resolved version of the document. Whether these analyses shed light on the various aspects of document length remains to be seen.

Another possible contributor to the unanticipated results is the form of the relevance judgment. A more continuous measure of relevance would have given more power and sensitivity to the statistical measures. When the difference between the relationships being tested in Appendix E are not statistically significant, it may be because there is no effect on resolution. However, an equal relationship can also occur when genuine differences exist. Because the users' relevance judgments were originally collected on a gross scale, measures of relationship are insensitive to differences in predicted relevance within any one of the four user-given relevance categories. Thus some of the anomalous results could be caused by a measurement limitation. Though possible, we find this explanation less plausible than that of document length.

Other explanations for the obtained results are likely to emerge from a careful study of individual retrieved documents. It is likely that some documents are strongly affected by resolution while others are not. This study examined the effect of resolution against a query and as a result "averaged out" the effect on the individual documents. A thorough analysis of what happened to individual documents within a given query should be instructive.

From Table 5 several queries seem obvious candidates for this "micro-evaluation" [18]. Query #109 is interesting because all of the significant findings were negative and there was no cumulative effect in Class R. Query #158 is similar except that the results for the individual anaphoric classes were positive. It might be instructive to compare the analysis of #158 with that of #180 (and #203) where all the positive results did lead to an overall positive effect in Class R. Query #212 is the only query that produced mixed results in the merged resolution set: perhaps something could be learned from it. Finally, it probably would be useful to examine a couple of queries that failed to achieve any significant results after resolution. Taken together, this sort of failure analysis may enable us to come to a final conclusion about the viability of our original hypothesis, or at least that version of it that pertains to abstract-length documents.

## REFERENCES

1. This report is based on a paper presented at the 1986 ASIS Annual Meeting, Chicago, Illinois.

2. Karen Sparck Jones, "Index Term Weighting", Information Storage and Retrieval, 9 (1973).

3. M.A.K. Halliday, & Ruqaiya Hasan, Cohesion in English, (London: Longman Group, 1976).

4. Daniel G. Bobrow, "A Question Answering System for High School Algebra Word Problems", AFIPS Conference Proceedings, 26 (1964).

5. Terry Winograd, Understanding Natural Language, (New York: Academic Press, 1972).

6. William A. Woods, et al. The LUNAR Science Natural Language Information System: Final Report, (Cambridge, Mass: Bolt, Beranek and Newman, Inc., Report 2378, 1972).

7. Charles J. Rieger, "Conceptual Memory and Inference". In Roger C. Schank (Ed.), Conceptual Information Processing. (Amsterdam: North-Holland, 1975).

8. Yorick A. Wilks, "An Intelligent Analyzer and Understander of English", Communications of the ACM, 18 (1975) 264-274.

9. Donald E. Walker, Understanding Spoken Language, (Amsterdam: North-Holland, 1978).

10. Wendy Lehnert, The Process of Question Answering: A Computer Simulation of Cognition. (Hillsdale, N.J., Laurence Erlbaum, 1978).

11. Gerard Salton & Michael J. McGill, Introduction to Modern Information Retrieval, (New York, McGraw-Hill, 1983).

12. John O'Connor, "Text Searching Retrieval of Answer Sentences and Other Answer Passages", Journal of the American Society for Information Science, 24 (1973) 445-460.

13. Donald Walker, "The Organization and Use of Information: Contributions of Information Science, Computational Linguistics and Artificial Intelligence". Journal of the American Society for Information Science, 32 (1981) 347-363.

14. Chris D. Paice, "The Automatic Generation of Literature Abstracts: An Approach Based on the Identification of Self-Indicating Phrases". In R. N. Oddy (Ed.) Information Retrieval Research, (London: Butterworths, 1981), 172-191.

15. Elizabeth Liddy, et al. "A Study of Discourse Anaphora in Scientific Abstracts". Journal of the American Society for Information Science, in press.

16. Jeffrey Katzer, et al. A Study of the Impact of Representations in Information Retrieval Systems. (Final Report to the National Science Foundation, July 1982).

17. Michael J. McGill, et al. An Evaluation of Factors Affecting Document Ranking by Information Retrieval Systems. (Final Report to the National Science Foundation, 1979).

18. D. W. King & E. C. Bryant, The Evaluation of Information Services and Products. (Washington, D.C., Information Resources Press, 1971).

# BIBLIOGRAPHY

## BIBLIOGRAPHY

Belkin, N.J.; Oddy, R.N.; Brooks, H.M. "ASK for Information Retrieval: Part 1. Background and Theory. Part II. Results of a Design Study." *Journal of Documentation*. 38 (2,3): 61-71, 145-164; 1982.

Bobrow, Daniel G., "A Question Answering System for High School Alebra Word Problems", *AFIPS Conference Proceedings*, 26 (1964).

Grimes, J. *The Thread of Discourse*. (The Hague: Mouton Publishers; 1975.)

Halliday, M.A.K., & Ruqaiya Hasan, *Cohesion in English* (London: Longman Group, 1976).

Hirst, G. *Anaphora in Natural Language Understanding: A Survey*. New York: Springer- Verlag; 1981.

Katzer, J., et al. *A Study of the Impact of Representations in Information Retrieval Systems*. (Final Report to the National Science Foundation, July, 1982).

King, D.W. & Bryant, E.C. *The Evaluation of Information Services and Products*. Washington, D.C. Information Resources Press, 1971.

Lehnert, Wendy, *The Process of Question Answering: A Computer Simulation of Cognition*. (Hillsdale, N.J., Lawrence Erlbaum, 1978).

Liddy, Elizabeth, et al. "A Study of Discourse Anaphora in Scientific Abstracts". *Journal of the American Society for Information Science*, in press.

McGill, Michael J., et al. *An Evaluation of Factors Affecting Document Ranking by Information Retrieval Systems*. (Final Report to the National Science Foundation, 1979).

O'Connor, John, "Text Searching Retrieval of Answer Sentences and other Answer Passages". *Journal of the American Society for Information Science*, 24 (1973) 445-460.

Oddy, R.N. A Study of Representations for Anomalous States of Knowledge in Information Retrieval. NSF Grant Proposal IST-8420608. Syracuse, New York: Syracuse University, School of Information Studies: 1984.

Paice, Chris D. "The Automatic Generation of Literature Abstracts: An Approach Based on the Identification of Self-Indicating Phrases". In R.N. Oddy (Ed.) Information Retrieval Research, (London: Butterworths, 1981), 172-191.

Quirk, R.; Greenbaum, S.; Leech, G.; Svartik, J. A Grammar of Contemporary English. London: Longmans; 1972.

Rieger, Charles J. "Conceptual Memory and Inference", In Roger C. Schank (Ed.) Conceptual Information Processing. (Amsterdam: North- Holland, 1975).

Salton, Gerard & McGill, Michael J. Introduction to Modern Information Retrieval. (New York, McGraw-Hill, 1983).

Sidner, C. Towards a Computational Theory of Definite Anaphora Comprehension in English Discourse. Artificial Intelligence Laboratory Report TR-537; Cambridge, Massachusetts: Massachusetts Institute of Technology; 1979.

Sparck Jones, Karen, "Index Term Weighting", Information Storage and Retrieval, 9 (1973) 619-633.

Waldstein, R. The Role of Noun Phrases as Content Indicators. Ph.D. Dissertation, Syracuse University, School of Information Studies, 1981.

Walker, Donald E. Understanding Spoken Language. (Amsterdam: North-Holland, 1978).

Walker, Donald, "The Organization and Use of Information: Contributions of Information Science, Computational Linguistics and Artificial Intelligence". Journal of the American Society for Information Science, 32 (1981) 347-363.

Webber, B.L. A Formal Approach to Discourse Anaphora. New York: Garland Publishing, Inc.; 1979.

Wilks, Yorick A., "An Intwllient Analyzer and Understander of English", Communications of the ACM, 18 (1975) 264-274.

Winograd, Terry, Understanding Natural Language. (New York: Academic Press, 1972).

Woods, William A., et al. The LUNAR Science Natural Language Information System Final Report. (Cambridge, Mass: Bolt, Beranek and Newman, Inc., Report 2378, 1972).

# APPENDICES

# APPENDIX A

## Preliminary Test, Functional Indexes

## PRELIMINARY TEST

## CLASS SUMMARY

| TERM | PSYCH. ABS. | | | INSPEC | | | TOTALS | | |
|---|---|---|---|---|---|---|---|---|---|
| | Ana. | Non. | F.I. | Ana. | Non. | F.I. | Ana. | Non. | F.I. |
| Central Pronouns | 244 | 60 | .80 | 143 | 46 | .76 | 387 | 106 | .78 |
| Nominal Demonstrative | 176 | 265 | .40 | 155 | 148 | .51 | 331 | 413 | .44 |
| Relative Pronouns | 227 | 255 | .47 | 192 | 88 | .69 | 419 | 343 | .55 |
| Nominal Substitutes | 60 | 63 | .49 | 64 | 71 | .47 | 124 | 134 | .48 |
| Pro-verb | 21 | 42 | .33 | 3 | 12 | .20 | 24 | 54 | .31 |
| Indefinites | 128 | 317 | .29 | 44 | 209 | .17 | 172 | 526 | .25 |
| Adjectives | 27 | 51 | .35 | 10 | 40 | .20 | 37 | 91 | .29 |
| Adverbs | 25 | 52 | .32 | 30 | 68 | .31 | 55 | 120 | .31 |
| S & Ss | 188 | 25 | .88 | -- | -- | -- | 188 | 25 | .88 |
| Definite Article | 251 | 1483 | .14 | 216 | 1485 | .13 | 467 | 2968 | .14 |
| TOTALS | 1347 | 2613 | .34 | 857 | 2167 | .28 | 2204 | 4780 | .32 |

"Central" Pronouns
(Personal, Possessive, Reflexive)

## CLASS SUMMARY

## PRELIMINARY TEST SET

| | TERM | PSYCH. ABS. | | | INSPEC | | | TOTALS | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Ana. | Non. | F.I. | Ana. | Non. | F.I. | Ana. | Non. | F.I. |
| ---PERSONAL--- | he | 5 | - | 1.00 | 6 | - | 1.00 | 11 | - | 1.00 |
| | him | - | - | - | 1 | - | 1.00 | 1 | - | 1.00 |
| | I | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| | she | 6 | - | 1.00 | - | - | - | 6 | - | 1.00 |
| | them | 12 | - | 1.00 | 3 | - | 1.00 | 15 | - | 1.00 |
| | they | 41 | - | 1.00 | 14 | - | 1.00 | 55 | - | 1.00 |
| | us | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| | we | 0 | 5 | 0 | 0 | 1 | 0 | 0 | 6 | 0 |
| POSSESSIVE--- | her | 12 | - | 1.00 | - | - | - | 12 | - | 1.00 |
| | his | 13 | - | 1.00 | 7 | - | 1.00 | 20 | - | 1.00 |
| | its | 16 | - | 1.00 | 42 | - | 1.00 | 58 | - | 1.00 |
| | our | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 4 | 0 |
| | their | 90 | - | 1.00 | 28 | - | 1.00 | 118 | - | 1.00 |
| | your | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| REFLECTIVE | herself | - | - | - | - | - | - | - | - | - |
| | himself | 2 | - | 1.00 | - | - | - | 2 | - | 1.00 |
| | itself | 3 | - | 1.00 | - | - | - | 3 | - | 1.00 |
| | themselves | 9 | - | 1.00 | - | - | - | 9 | - | 1.00 |
| | Sub-total | 209 | 12 | .95 | 101 | 3 | .97 | 310 | 15 | .95 |
| | it | 35 | 48 | .42 | 42 | 43 | .49 | 77 | 91 | .46 |
| | TOTALS | 244 | 60 | .80 | 143 | 46 | .76 | 387 | 106 | .78 |

Nominal Demonstratives

## CLASS SUMMARY

## PRELIMINARY TEST SET

| TERM | PSYCH. ABS. | | | INSPEC | | | TOTALS | | |
|---|---|---|---|---|---|---|---|---|---|
| | Ana. | Non. | F.I. | Ana. | Non. | F.I. | Ana. | Non. | F.I. |
| this | 71 | 7 | .91 | 88 | 59 | .60 | 159 | 66 | .71 |
| these | 61 | - | 1.00 | 50 | 3 | .94 | 111 | 3 | .97 |
| those | 29 | 6 | .83 | 7 | 1 | .88 | 36 | 7 | .84 |
| that | 15 | 252* | .04 | 10 | 85* | .10 | 25 | 337* | .07 |
| TOTALS | 176 | 265 | .40 | 155 | 148 | .51 | 331 | 413 | .44 |

*occurrences of "that" used as a relative pronoun are not included in this figure.

## Relative Pronouns

### CLASS SUMMARY
### PRELIMINARY TEST SET

| TERM | PSYCH. ABS. | | | INSPEC | | | TOTALS | | |
|---|---|---|---|---|---|---|---|---|---|
| | Ana. | Non. | F.I. | Ana. | Non. | F.I. | Ana. | Non. | F.I. |
| who | 39 | - | 1.00 | 2 | - | 1.00 | 41 | - | 1.00 |
| whom | 3 | - | 1.00 | - | - | - | 3 | - | 1.00 |
| whose | 3 | - | 1.00 | 2 | - | 1.00 | 5 | - | 1.00 |
| which | 71 | 2 | .97 | 120 | 2 | .98 | 191 | 4 | .98 |
| where | 9 | 1 | .90 | 19 | 1 | .95 | 28 | 2 | .93 |
| that | 102 | 252* | .29 | 49 | 85* | .37 | 151 | 337* | .31 |
| TOTALS | 227 | 255 | .49 | 192 | 88 | .69 | 419 | 343 | .55 |

*occurrences of "that" as a nominal demonstrative are not included in this figure.

Nominal Substitutes

Appendix A-5

## CLASS SUMMARY

## PRELIMINARY TEST SETS

| TERM | PSYCH. ABS. | | | INSPEC | | | TOTALS | | |
|---|---|---|---|---|---|---|---|---|---|
| | Ana. | Non. | F.I. | Ana. | Non. | F.I. | Ana. | Non. | F.I. |
| above | - | 3 | - | 1 | - | 1.00 | 1 | 3 | .25 |
| former | - | - | - | 2 | - | 1.00 | 2 | - | 1.00 |
| last | - | 2 | 0 | - | 2 | 0 | - | 4 | 0 |
| latter | 3 | 0 | 1.00 | 4 | 0 | 1.00 | 7 | 0 | 1.00 |
| one<br>one's<br>ones' | 7 | 17 | .29 | 8 | 30 | .21 | 15 | 47 | .24 |
| other | 33 | 8 | .80 | 27 | 4 | .87 | 60 | 12 | .83 |
| others | 4 | 6 | .40 | 6 | 0 | 1.00 | 10 | 6 | .62 |
| same | 13 | 15 | .46 | 4 | 11 | .26 | 17 | 26 | .40 |
| Sub-Totals | 60 | 51 | .54 | 52 | 47 | .52 | 112 | 98 | .53 |
| first | - | 5 | 0 | 8 | 12 | .40 | 8 | 17 | .32 |
| second | - | 2 | 0 | 3 | 7 | .30 | 3 | 9 | .25 |
| third | - | 3 | 0 | 1 | - | 1.00 | 1 | 3 | .25 |
| fourth | - | 1 | 0 | - | 2 | 0 | - | 3 | 0 |
| fifth | - | 1 | 0 | - | 1 | 0 | - | 2 | 0 |
| sixth | - | - | - | - | 1 | 0 | - | 1 | 0 |
| seventh | - | - | - | - | - | - | - | - | - |
| eighth | - | - | - | - | - | - | - | - | - |
| ninth | - | - | - | - | 1 | 0 | - | 1 | 0 |
| tenth | - | - | - | - | - | - | - | - | - |
| Sub-Totals | - | 12 | 0 | 12 | 24 | .33 | 12 | 36 | .25 |
| TOTALS | 60 | 63 | .49 | 64 | 71 | .47 | 124 | 134 | .48 |

## Proverbial

## CLASS SUMMARY

## PRELIMINARY TEST SET

| TERM | PSYCH. ABS. | | | INSPEC | | | TOTALS | | |
|---|---|---|---|---|---|---|---|---|---|
| | Ana. | Non. | F.I. | Ana. | Non. | F.I. | Ana. | Non. | F.I. |
| do<br>(do, did,<br>does,<br>doing,<br>done) | 21 | 42 | .33 | 3 | 12 | .20 | 24 | 54 | .31 |

Appendix A-7

## INDEFINITES

### CLASS SUMMARY
### PRELIMINARY TEST SET

| TERM | PSYCH. ABS. | | | INSPEC | | | TOTALS | | |
|---|---|---|---|---|---|---|---|---|---|
| | Ana. | Non. | F.I. | Ana. | Non. | F.I. | Ana. | Non. | F.I. |
| all | 14 | 26 | .35 | 7 | 17 | .29 | 21 | 43 | .33 |
| any | 2 | 7 | .22 | - | 15 | 0 | 2 | 22 | .08 |
| anyone | - | 1 | 0 | - | 1 | 0 | - | 2 | 0 |
| anything | - | 1 | 0 | - | - | - | - | 1 | 0 |
| each | 29 | 28 | .51 | 17 | 24 | .41 | 46 | 52 | .47 |
| either | 20 | 12 | .62 | 2 | 3 | .40 | 22 | 15 | .59 |
| enough | - | 1 | 0 | - | - | - | - | 1 | 0 |
| every | - | 2 | 0 | - | 4 | 0 | - | 6 | 0 |
| everything | - | - | - | - | - | - | - | - | - |
| few | - | 6 | 0 | - | 4 | 0 | - | 10 | 0 |
| fewer | 1 | 9 | .10 | - | - | - | 1 | 9 | .10 |
| least | - | 8 | 0 | - | 6 | 0 | - | 14 | 0 |
| less | 10 | 22 | .31 | - | 4 | 0 | 10 | 26 | .28 |
| little | - | 4 | 0 | - | 1 | 0 | - | 5 | 0 |
| many | 2 | 10 | .17 | 1 | 14 | .07 | 3 | 24 | .11 |
| more | 39 | 49 | .44 | 11 | 11 | .50 | 50 | 60 | .46 |
| most | 2 | 29 | .06 | 1 | 8 | .11 | 3 | 37 | .08 |
| much | 3 | 4 | .43 | 1 | 2 | .33 | 4 | 6 | .40 |
| neither | 2 | - | 1.00 | - | 1 | 0 | 2 | 1 | .66 |
| no | 3 | 58 | .05 | 2 | 13 | .13 | 5 | 71 | .06 |
| none | - | 1 | 0 | 1 | 1 | .50 | 1 | 2 | .33 |
| nothing | - | 1 | 0 | - | - | - | - | 1 | 0 |
| several | - | 9 | 0 | - | 30 | 0 | - | 39 | 0 |
| some | 1 | 26 | .04 | 1 | 50 | .02 | 2 | 76 | .02 |
| someone | - | - | - | - | - | - | - | - | - |
| something | - | 3 | - | - | - | - | - | 3 | 0 |
| TOTALS | 128 | 317 | .29 | 44 | 209 | .17 | 172 | 526 | .25 |

## CLASS SUMMARY

## PRELIMINARY TEST SET

| TERM | PSYCH. ABS. | | | INSPEC | | | TOTALS | | |
|---|---|---|---|---|---|---|---|---|---|
| | Ana. | Non. | F.I. | Ana. | Non. | F.I. | Ana. | Non. | F.I. |
| additional | - | 2 | 0 | 1 | 3 | .25 | 1 | 5 | .17 |
| another | 2 | 3 | .40 | 1 | 3 | .25 | 3 | 6 | .33 |
| both | 18 | 36 | .33 | 1 | 25 | .04 | 19 | 61 | .25 |
| else | - | - | - | - | 1 | 0 | 0 | 1 | 0 |
| equal | - | 5 | 0 | - | 1 | 0 | 0 | 6 | 0 |
| identical | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 3 | 0 |
| TOTALS | 20 | 48 | .29 | 3 | 34 | .08 | 23 | 82 | .22 |

## CLASS SUMMARY

## PRELIMINARY TEST SET

| TERM | PSYCH. ABS. | | | INSPEC | | | TOTALS | | |
|---|---|---|---|---|---|---|---|---|---|
| | Ana. | Non. | F.I. | Ana. | Non. | F.I. | Ana. | Non. | F.I. |
| here | - | 2 | 0 | 1 | 2 | .33 | 1 | 4 | .20 |
| identically | - | - | - | - | 1 | 0 | - | 1 | 0 |
| similarly | 1 | 1 | .50 | - | - | - | 1 | 1 | .50 |
| so | 3 | 8 | .27 | - | 15 | 0 | 3 | 23 | .12 |
| such | 16 | 17 | .48 | 20 | 27 | .42 | 36 | 44 | .45 |
| then | 1 | 14 | .07 | 1 | 24 | .04 | 2 | 38 | .05 |
| there | - | 36 | 0 | 1 | 24 | .04 | 1 | 60 | .02 |
| therin | - | - | - | 1 | - | 1.00 | 1 | 0 | 1.00 |
| thus | - | 10 | 0 | - | 3 | 0 | - | 13 | 0 |
| viceversa | 1 | - | 1.00 | - | - | - | 1 | - | 1.00 |
| TOTALS | 22 | 88 | .20 | 24 | 96 | .20 | 46 | 184 | .20 |

## APPENDIX B

### Retrieval Experiment,
### Functional Indexes

# RETRIEVAL EXPERIMENT

## CLASS SUMMARY

| CLASS | PSYCH. ABS. | | | INSPEC | | | TOTALS | | |
|---|---|---|---|---|---|---|---|---|---|
| | Ana. | Non. | F.I. | Ana. | Non. | F.I. | Ana. | Non. | F.I. |
| Central Pronouns | 257 | 55 | .82 | 188 | 29 | .87 | 445 | 84 | .84 |
| Nominal Demonstrative | ]48 | ]72 | .46 | 169 | 131 | .56 | 317 | 303 | .51 |
| Relatives | 219 | 168 | .57 | 184 | 82 | .69 | 403 | 250 | .62 |
| Nominal Substitutes | 78 | 76 | .51 | 49 | 76 | .39 | 127 | 152 | .45 |
| Pro-verb | 11 | 20 | .35 | 1 | 17 | .06 | 12 | 37 | .24 |
| Indefinites | 112 | 235 | .32 | 35 | 202 | .15 | 147 | 437 | .25 |
| Adjectives | 27 | 51 | .35 | 10 | 40 | .20 | 37 | 91 | .29 |
| Adverbs | 25 | 52 | .32 | 30 | 68 | .31 | 55 | 120 | .31 |
| S & Ss | 124 | 25 | .83 | - | - | - | 124 | 25 | .83 |
| Definite | 277 | 1303 | .17 | 327 | 1526 | .18 | 604 | 2829 | .18 |
| TOTALS | 1278 | 2157 | .37 | 993 | 2171 | .31 | 2271 | 4328 | .34 |

'Central' Pronouns
(Personal, Possessive, Reflexive)

Appendix B-2

## CLASS SUMMARY

## RETRIEVAL EXPERIMENT SET

| | TERM | PSYCH. ABS. | | | INSPEC | | | TOTALS | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Ana. | Non. | F.I. | Ana. | Non. | F.I. | Ana. | Non. | F.I. |
| Personal | he | 3 | - | 1.00 | 11 | - | 1.00 | 14 | - | 1.00 |
| | him | 1 | - | 1.00 | - | - | 1.00 | 1 | - | 1.00 |
| | she | 5 | - | 1.00 | 1 | - | 1.00 | 6 | - | 1.00 |
| | they | 28 | - | 1.00 | 17 | - | 1.00 | 45 | - | 1.00 |
| | them | 14 | - | 1.00 | 8 | - | 1.00 | 22 | - | 1.00 |
| Possessive | his | 15 | - | 1.00 | 7 | - | 1.00 | 22 | - | 1.00 |
| | her | 13 | - | 1.00 | - | - | 1.00 | 13 | - | 1.00 |
| | its | 15 | - | 1.00 | 42 | - | 1.00 | 57 | - | 1.00 |
| | their | 123 | - | 1.00 | 39 | - | 1.00 | 162 | - | 1.00 |
| Reflexive | herself | 1 | - | 1.00 | - | - | 1.00 | 1 | - | 1.00 |
| | himself | - | - | 1.00 | - | - | 1.00 | - | - | 1.00 |
| | itself | 2 | - | 1.00 | 3 | - | 1.00 | 5 | - | 1.00 |
| | themselves | 9 | - | 1.00 | 3 | - | 1.00 | 12 | - | 1.00 |
| | sub-total | 229 | - | 1.00 | 131 | - | 1.00 | 360 | - | 1.00 |
| | it | 28 | 55 | .34 | 57 | 29 | .66 | 85 | 84 | .61 |
| | TOTALS | 257 | 55 | .82 | 188 | 29 | .87 | 445 | 84 | .84 |

## CLASS SUMMARY

## RETRIEVAL EXPERIMENT SET

| TERM | PSYCH. ABS. | | | INSPEC | | | TOTALS | | |
|---|---|---|---|---|---|---|---|---|---|
| | Ana. | Non. | F.I. | Ana. | Non. | F.I. | Ana. | Non. | F.I. |
| this | 56 | 7 | .88 | 88 | 54 | .62 | 144 | 61 | .70 |
| these | 52 | 1 | .98 | 64 | 2 | .97 | 116 | 3 | .97 |
| those | 25 | 1 | .96 | 6 | 6 | .50 | 31 | 7 | .82 |
| that | 15 | 163 | .08 | 11 | 69 | .13 | 26 | 232 | .10 |
| TOTALS | 148 | 172 | .46 | 169 | 131 | .56 | 317 | 303 | .51 |

## CLASS SUMMARY

## RETRIEVAL EXPERIMENT SET

| TERM | PSYCH. ABS. | | | INSPEC | | | TOTALS | | |
|---|---|---|---|---|---|---|---|---|---|
| | Ana. | Non. | F.I. | Ana. | Non. | F.I. | Ana. | Non. | F.I. |
| who | 63 | - | 1.00 | 5 | 4 | .55 | 68 | 4 | .94 |
| whom | 3 | - | 1.00 | - | - | - | 3 | - | 1.00 |
| whose | 6 | - | 1.00 | 4 | - | 1.00 | 10 | - | 1.00 |
| which | 68 | 4 | .94 | 123 | 1 | .99 | 191 | 5 | .97 |
| where | 6 | 62 | .75 | 4 | 8 | .33 | 10 | 10 | .50 |
| that | 73 | 162 | .31 | 48 | 69 | .41 | 121 | 231 | .34 |
| TOTALS | 219 | 168 | .57 | 184 | 82 | .69 | 403 | 250 | .62 |

## CLASS SUMMARY

## RETRIEVAL EXPERIMENT SET

| TERM | PSYCH. ABS. | | | INSPEC | | | TOTALS | | |
|---|---|---|---|---|---|---|---|---|---|
| | Ana. | Non. | F.I. | Ana. | Non. | F.I. | Ana. | Non. | F.I. |
| above | 1 | 1 | .50 | 2 | - | 1.00 | 3 | 1 | .75 |
| former | | - | - | - | - | - | - | - | - |
| last | 1 | - | 1.00 | 1 | 3 | .25 | 2 | 3 | .40 |
| latter | 2 | - | 1.00 | 3 | - | 1.00 | 5 | - | 1.00 |
| one, ones | 10 | 15 | .40 | 10 | 25 | .29 | 20 | 40 | .30 |
| other | 43 | 9 | .83 | 15 | 4 | .79 | 58 | 13 | .82 |
| others | 3 | 12 | .20 | 2 | - | 1.00 | 5 | 12 | .29 |
| same | 2 | 6 | .25 | 6 | 1 | .86 | 8 | 7 | .53 |
| Sub-Totals | 62 | 43 | .59 | 39 | 33 | .54 | 101 | 76 | .57 |
| first, 1st | 7 | 13 | .35 | 5 | 27 | .16 | 12 | 40 | .23 |
| second, 2nd | 6 | | .75 | 4 | 13 | .24 | 10 | 15 | .40 |
| third, 3rd | 2 | 5 | .29 | 1 | 2 | .33 | 3 | 7 | .30 |
| fourth,4th | 1 | 4 | .20 | - | - | - | 1 | 4 | .20 |
| fifth,5th | - | 2 | 0 | - | 1 | 0 | - | 3 | 0 |
| sixth,6th | - | 5 | 0 | - | - | - | - | 5 | 0 |
| seventh,7th | - | 1 | 0 | - | - | - | - | 1 | 0 |
| eighth,8th | - | 1 | 0 | - | - | - | - | 1 | 0 |
| ninth,9th | - | - | - | - | - | - | - | - | - |
| tenth,10th | - | - | - | - | - | - | - | - | - |
| Sub-totals | 16 | 33 | .33 | 10 | 43 | .19 | 26 | 76 | .25 |
| TOTALS | 78 | 76 | .51 | 49 | 76 | .39 | 127 | 152 | .45 |

## CLASS SUMMARY

## RETRIEVAL EXPERIMENT SET

| TERM | PSYCH. ABS. | | | INSPEC | | | TOTALS | | |
|---|---|---|---|---|---|---|---|---|---|
| | Ana. | Non. | F.I. | Ana. | Non. | F.I. | Ana. | Non. | F.I. |
| Do<br>(do, did, does,doing done) | 11 | 20 | .35 | 1 | 17 | .06 | 12 | 37 | .24 |

# CLASS SUMMARY

## RETRIEVAL EXPERIMENT SET

| TERM | PSYCH. ABS. | | | INSPEC | | | TOTALS | | |
|---|---|---|---|---|---|---|---|---|---|
| | Ana. | Non. | F.I. | Ana. | Non. | F.I. | Ana. | Non. | F.I. |
| all | 12 | 17 | .41 | 2 | 28 | .06 | 14 | 45 | .24 |
| any | 1 | 9 | .10 | 2 | 13 | .13 | 3 | 22 | .12 |
| anyone | - | - | - | - | - | - | - | - | - |
| anything | - | - | - | - | - | - | - | - | - |
| each | 28 | 14 | .66 | 17 | 14 | .55 | 45 | 28 | .62 |
| either | 15 | 2 | .88 | 6 | - | 1.00 | 21 | 2 | .91 |
| enough | - | - | - | - | 3 | 0 | - | 3 | 0 |
| every | - | 2 | 0 | - | 6 | 0 | - | 8 | 0 |
| everything | - | 1 | 0 | - | - | - | - | 1 | 0 |
| few | - | 5 | 0 | - | 4 | 0 | - | 9 | 0 |
| fewer | 1 | 5 | .17 | - | - | - | 1 | 5 | .17 |
| least | - | 3 | 0 | - | 4 | 0 | - | 7 | 0 |
| less | 4 | 10 | .28 | 1 | 2 | .33 | 5 | 12 | .29 |
| little | - | 9 | 0 | - | 2 | 0 | - | 11 | 0 |
| many | 1 | 9 | .10 | 1 | 33 | .03 | 2 | 42 | .04 |
| more | 40 | 56 | .42 | 3 | 30 | .09 | 43 | 86 | .33 |
| most | 3 | 20 | .13 | - | 7 | 0 | 3 | 27 | .10 |
| much | - | 3 | 0 | 2 | 8 | .20 | 2 | 11 | .15 |
| neither | 1 | 5 | .16 | - | - | - | 1 | 5 | .16 |
| no | 2 | 29 | .06 | - | 4 | 0 | 2 | 33 | .06 |
| none | 1 | 1 | .50 | - | - | - | 1 | 1 | .50 |
| nothing | - | 1 | 0 | - | - | - | - | 1 | 0 |
| several | 1 | 11 | .08 | 1 | 20 | .05 | 2 | 31 | .06 |
| some | 2 | 22 | .08 | - | 24 | 0 | 2 | 46 | .04 |
| someone | - | 1 | 0 | - | - | - | - | 1 | 0 |
| something | - | - | - | - | - | - | - | - | - |
| TOTALS | 112 | 235 | .32 | 35 | 202 | .15 | 147 | 437 | .25 |

## CLASS SUMMARY

## RETRIEVAL EXPERIMENT SET

| TERM | PSYCH. ABS | | | INSPEC | | | TOTALS | | |
|---|---|---|---|---|---|---|---|---|---|
| | Ana. | Non. | F.I. | Ana. | Non. | F.I. | Ana. | Non. | F.I. |
| additional | - | 3 | 0 | - | 4 | 0 | - | 7 | 0 |
| another | 2 | 7 | .22 | 6 | 2 | .75 | 8 | 9 | .47 |
| both | 25 | 32 | .44 | 3 | 32 | .09 | 28 | 64 | .30 |
| else | - | 1 | 0 | - | - | - | - | 1 | 0 |
| equal | - | 2 | 0 | - | 1 | 0 | - | 3 | 0 |
| identical | - | 6 | 0 | 1 | 1 | .50 | 1 | 7 | .12 |
| TOTALS | 27 | 51 | .35 | 10 | 40 | .20 | 37 | 91 | .29 |

## CLASS SUMMARY

## RETRIEVAL EXPERIMENT SET

| TERM | PSYCH. ABS. | | | INSPEC | | | TOTALS | | |
|---|---|---|---|---|---|---|---|---|---|
| | Ana. | Non. | F.I. | Ana. | Non. | F.I. | Ana. | Non. | F.I. |
| here | - | 2 | 0 | - | 2 | 0 | - | 4 | - |
| identically | - | - | - | - | - | - | - | - | - |
| similarly | 1 | - | 1.00 | - | - | - | 1 | - | 1.00 |
| so | 3 | 3 | .50 | - | 19 | 0 | 3 | 22 | .12 |
| such | 21 | 8 | .72 | 27 | 19 | .59 | 48 | 27 | .64 |
| then | - | 6 | 0 | 1 | 9 | .10 | 1 | 15 | .06 |
| there | - | 29 | 0 | - | 12 | 0 | - | 41 | 0 |
| therein | - | - | - | 1 | - | 1.00 | 1 | - | 1.00 |
| thus | - | 4 | 0 | - | 7 | 0 | - | 11 | 0 |
| viceversa | - | - | - | 1 | - | 1.00 | 1 | - | 1.00 |
| TOTALS | 25 | 52 | .32 | 30 | 68 | .31 | 55 | 120 | .31 |

## CLASS SUMMARY

## RETRIEVAL EXPERIMENT SET

| TERM | PSYCH. ABS. | | | INSPEC | | | TOTALS | | |
|---|---|---|---|---|---|---|---|---|---|
| | Ana. | Non. | F.I. | Ana. | Non. | F.I. | Ana. | Non. | F.I. |
| S and Ss | 124 | 25 | .83 | - | - | - | 124 | 25 | .83 |

## CLASS SUMMARY

## RETRIEVAL EXPERIMENT SET

| TERM | PSYCH. ABS. | | | INSPEC | | | TOTALS | | |
|---|---|---|---|---|---|---|---|---|---|
| | Ana. | Non. | F.I. | Ana. | Non. | F.I. | Ana. | Non. | F.I. |
| the | 277 | 1303 | .17 | 327 | 1526 | .18 | 604 | 2829 | .18 |

# APPENDIX C

## Linguistic Analysis

# APPENDIX C

This appendix contains results of our detailed linguistic analysis of all the potentially anaphoric terms which were observed to function anaphorically in the sample of 600 abstracts. This analysis attempted to delineate the specific lexical environments which could be used to reliably predict whether a term was anaphoric or not in specific instances.

These rule-oriented analyses then served as the basis for the rule-sets tested by independent judges to determine whether the P.A./F.A. distinction was adequately captured in the rules. The high success rate of that testing (see Appendix D) indicates that these algorithmic type rules, once captured in formalized code, may be useful in enabling a system to determine automatically whether a P. A. is an F. A.

## Contents of Appendix C

## Central Pronouns

Quirk & Greenbaum sub-divide the major class of 'Central Pronouns' into these three minor classes: 1) Personal pronouns; 2) Possessive pronouns, and; 3) Reflexive pronouns. The individual members of these classes are:

Personal: I, me, we, us, you, he, him, she, her,[1] it,[2] they, them.

Possessive: my, mine, our, ours, your, yours, his, her, hers, its, their, theirs.

Reflexive: myself, ourselves, yourself, yourselves, himself, herself, itself, themselves.

Only those pronouns which are underlined were observed in the subset of 600 abstracts.

The anaphoric use of these three types of pronouns can be predicted by the person distinction which pronouns demonstrate (1st person, 2nd person, 3rd person). Of the 325 occurrences of the Central Pronouns, all 1st and 2nd person pronouns (15 occurrences), whether personal, possessive, or reflexive were non-anaphoric, while all 3rd person pronouns (310 occurrences) were anaphoric.

The non-anaphoric uses are deictic references to either the author(s) of the abstract:

(1) Our research complements the EPA guidelines...

(2) The system that we are developing...

or to rather indeterminate, unspecified individuals:

(3) Discovering your radiant self. (title)

(4) Three paradoxes are considered: (a) We hurt and are hurt by those we love...

(5) Explores the idea that Gestalt concepts apply to our physical as well as our mental being.

It is unnecessary, therefore, to develop rules to determine whether in a particular instance a central pronoun is anaphoric or not. Automatic matching against lists of pronouns tagged for person-distinction should suffice to locate anaphoric references.

[1] Belongs to both Personal and Possessive classes

[2] 'It' is handled in a separate analysis.

From information found in standard grammar sources,[1] it appears that 'it' has four possible uses, only two of which have been observed extensively in the samples of abstracts. The other two uses had only 1 occurrence each. All four will, however, be detailed here since it is necessary to weed out all non-anaphoric uses. The first three uses are non-anaphoric and they will be presented in order of their ease of distinguishability from the other cases. The anaphoric use will be presented last since it does not occur in as predictable a syntactic environment as do the nonanaphoric uses.

Empty/Prop: 'It' may be used to refer to the rather indeterminate notion of the general state of affairs. Frequently this use is to do with the weather or the time.

(2) It is raining out.

(3) It is nine-thirty.

The next two uses appear to be special cases of the more general notion of cataphoric use of 'it'. In both uses the referent for which 'it' is substituting, follows 'it' in the text.

Anticipatory: 'It' appears as the result of rearrangement of terms from the usual S-V-O word order by the movement rule known in transformational grammar as extraposition. This involves movement of a clausal subject from the original syntactic structure of:

clausal subject + pred

to a position toward the end of the sentence. The postponed element's position is filled by the anticipatory pronoun 'it'. The resulting syntactic structure is:

'it' + pred + clausal subject

Observation of the abstracts reveals that the predicate in this type construction appears to be either:

1. Of the class of cognitive/emotive verbs of thinking, knowing, feeling, etc., followed by 'that' and an independent clause:

(4a) It is emphasized that the evidence was obtained from normal children reared in their natural homes by their biological parents.

[1] Quirk, Greenbaum, Leech & Svartvik. A Grammar of Contemporary English, Longman Group, 1980.

'for'. Some common constructions are: 'It it possible for'; 'It was difficult for'; 'It is unrealistic to'.

(5a) It is crucial for therapists to feel free to discuss uses and abuses of this money with patients.

In all instances of extraposition, one can easily rearrange the sentence elements to return to normal S-V-O order by substituting the clausal subject for 'it'.

(4b) That the evidence was obtained from normal children reared in their natural homes by their biological parents is emphasized.

(5b) For therapists to feel free to discuss uses and abuses of this money with patients is crucial.

Cleft sentence: 'It' is used in constructions of this type to permit focal prominence to be given to a particular item in the sentence. Sentence elements are rearranged from normal order to:

'It' + form of 'to be' + focus element + rel. clause

(6) It was the weather that caused the picnic's cancellation.

Cleft sentences can be differentiated from anticipatory constructions by the fact that the clause postponed in anticipatory usage is an independent clause in which the subordinating conjunction does not fill a syntactic slot. On the other hand, in cleft sentences the head of the relative clause fills a syntactic role in the clause.

Anaphoric: 'It' performs as an anaphoric item when 'it' is in its role as a personal pronoun, i. e., it serves as an abbreviated reference to a more fully explicated antecedent. However, 'it' differs from all other personal pronouns in that 'it' has the capability of extended reference. 'It' may replace a whole clause or sentence or 'it' may simply refer to a single word. Also, in anaphoric usage, 'it' may be related to its antecedent either by 'identity of reference' or 'identity of specification'. In identity of reference, 'it' refers to the exact same entity as the antecedent.

(7) Feedback has an impact on the strength of beliefs to which it is targeted.

Whereas, in identity of specification, 'it' refers to a separate entity but one that is specified in same manner as its antecedent.

(8) Paul ordered a dish of spaghetti for dinner.
Bill ordered ıt too.

## Nominal Demonstratives

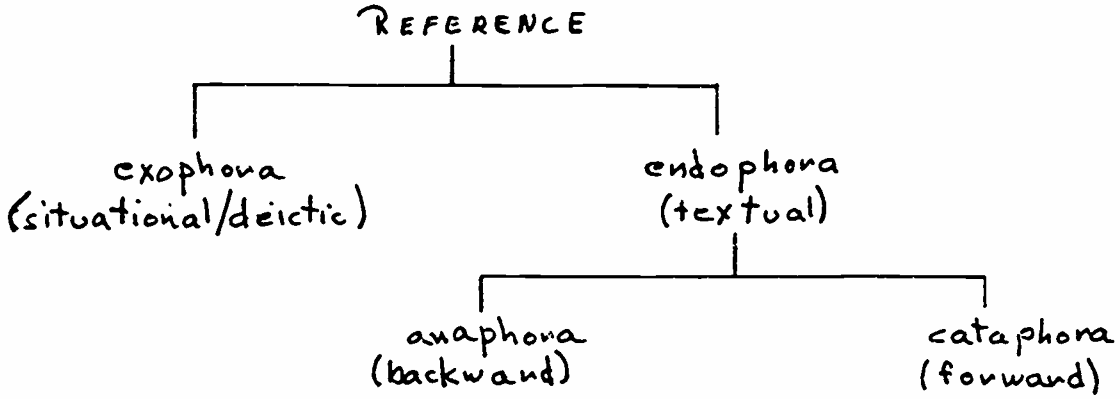
Demonstrative reference is essentially a form of verbal pointing. There are 4 nominal demonstratives: 'this', 'these', 'those', and 'that'. The nominal demonstratives 'this', 'these', and 'those' function only as referential items. They have no other use. 'That' has four senses associated with it, and will be treated separately.

### THIS, THESE, THOSE

When any of these 3 terms are encountered in the text, what must be determined, therefore, is:

1. Whether the reference is situational (exophoric/deictic) or textual (endophoric).

2. If endophoric, whether the reference is backward in text (anaphoric) or forward in text (cataphoric).



In making the first determination, the fact that abstracts are quite self-contained and non-situationally dependent predicts that the endophoric use is common and the exophoric quite uncommon. This has been observed to be the case. Therefore, it is more efficient to proceed by determining the contextual clues (lexical, not syntactic) that indicate exophoric use, rather than clues to endophoric use.

There exist two general cases of exophoric use of nominal demonstratives as exhibited in abstracts. The first of these is deictic reference to either: 1) the document of which the abstract is a part or: 2) the time at which the document was written. 'This' is the usual nominal demonstrative chosen for such use and typical phrases are: 'in this paper', 'at this writing', or 'this report'.

> E.g. "The discussion of sexual behavior in this paper is confined to heterosexual activities."

The second general case of exophoric use of nominal demonstratives exemplifies the larger phenomenon of refering to indeterminate referents which are presumed to exist but which are not specified. Phrases composed of double pronouns such as 'those who', 'anyone who', or 'that which' are common lexical indicators used to refer to someone orsomething without actually denoting anyone oranything.

> E.g. "People who buy social science should remember that data can easily be misconstrued or misrepresented by those who wish to prove their particular argument, for any of a number of reasons."

The second determination is whether the endophoric reference is anaphoric or cataphoric. In abstracts, cataphoric noun phrases are used to introduce a list, and are usually followed by a colon.[1]

> E.g. "The experiment tested these three approaches:"

## Classifying

Having eliminated the non-functioning P.A.'s, the F.A.'s may be classified. 'This', 'these' and 'those' function anaphoricaly either as:

- Demonstrative adjective
- Demonstrative pronoun

Classify as demonstrative adjective if the term is followed by a noun or an adjective. Otherwise, classify as demonstrative pronoun.

## THAT

'That' has four senses associated with it. Three of these are referential uses and the reference is anaphoric for each use.

- Demonstrative adjective
- Demonstrative pronoun
- Relative pronoun

Non-anaphorically, 'that' functions as:

- Subordinating conjunction

To determine in a particular instance whether 'that' is an F.A., the one non-anaphoric use will be tested for, and all such uses excluded from further analysis.

'That', in its role as a subordinating conjunction, occurs in two contexts and appears to be acting as a lexical colon in both. In one context, the role of 'that' as a subordinating conjunction is recognizable by these two facts.

1. 'That' follows cognitive/emotive verbs of:

   - knowing
   - thinking
   - believing
   - fearing
   - saying
   - remembering
   - perceiving

   or their nominalisation:

   - assumption
   - suggestion
   - hypothesis
   - explanation
   - suggestion

2. The clause introduced by 'that' contains no empty syntactic slot, i. e. the clause is complete, it consists of subject-verb-object, in any order.

   > E.g. "It was determined that a very definite advantage is achieved when the airflow is reversed periodically."

One seemingly troublesome construction, 'that is', is actually an ellipsed variant of the phrase 'that is to say' and serves as an indicator of a subsequent phrase of apposition. The ellipsed verb 'say' belongs to the class of cognitive verbs which indicate use of 'that' as a subordinating conjunction. Therefore, the construction 'that is' will be classified as such.

> E.g. "In the first, the concern is to construct a resistivity structure whose responses are acceptably close to the observations, that is, the measured amplitudes and/or phrases."

In the second context, 'that' is one component of a compound subordinating conjunction, and is recongnizable by two facts:

1. 'That' is the final element in constructions of the following type:

   - but that
   - in that
   - such that
   - so that
   - in order that

2. Again in this context, the clause introduced by 'that' contains no empty syntactic slot.

   > E.g. "Skinner's concept of contingencies of reinforcement may be a crucial one for understanding the relationship between the arts and the sciences in that each involves processes and products of human behavior."

<u>Classifying</u>

Having excluded non-anaphoric occurrences of 'that', the remaining instances may be classified.

- Classify as relative pronoun if 'that' introduces a clause that is not complete, i.e. contains a syntactically empty slot.

  > E.g. "Phillips developed a system that diagnosed human illness."

- Classify as demonstrative adjective if followed by noun or adjective.

  > E.g. "Selected components of that framework are empirically tested."

- Otherwise, classify as demonstrative pronoun.

  > E.g. "The performance of the model is compared to that of the physicians."

[1] Based on three cataphoric instances in sample of 600 abstracts.

## Relative Pronouns

Relative pronouns introduce relative clauses postmodifying nominal heads, and have anaphoric reference to the antecedent noun phrase which is postmodified by the entire relative clause. This class of pronouns consists of the following terms: who, whom, whose, which, and that.[1] All of these terms were observed in the subset of 600 abstracts.

All occurrences of 'who', 'whom', and 'whose' were anaphoric while 4 of the 195 ocurrences of 'which' were nonanaphoric. Therefore, only rules for determining anaphoric vs. nonanaphoric use of 'which' were developed.

### Anaphoric Use

The anaphoric use of 'which' occurs in three different syntactic environments.

1. 'Which' may follow immediately the nominal head it postmodifies.

   (1) Performance is compared with the traditional algorithm which employs only swapping.

2. 'Which' may be immediately preceded by and function as object of a prepositicn.

   (2) The process is modelled by a hyperbolic system in which the inflows act both as distributed and as boundary controls.

3. 'Which' may follow a verb in the passive voice, which separates the relative pronoun from the nominal head it postmodifies. This usage can be determined by the fact that these passive verb phrases can be moved to the end of the relative clause without altering the meaning of the sentence or damaging its grammaticality.

   (3) An algorithm is presented which maps patterns from a high-dimensional space to a plane.

### Non-anaphoric Use

- 'Which' in its nonanaphoric usage acts as an indefinite determiner of the noun phrase which follows it. The typical syntactic environment for this usage is:

  verb + 'which' + noun phrase

The verb phrase is usually active and can in no way be moved without damaging the grammaticality and sense of the sentence.

(4) The study will attempt to determine which method of analysis will be most cost-effective.

[1] That was treated in the analysis of nominal demonstratives, and will not be reconsidered here.

# Nominal Substitutes

The set of terms considered as nominal substitutes was completed with the following summary results:

| | P.A. | | Ins. | | Total | | |
|---|---|---|---|---|---|---|---|
| | Ana. | Non. | Ana. | Non. | Ana. | Non. | F.I. |
| above | 0 | 3 | 1 | 0 | 1 | 3 | .25 |
| former | 0 | 0 | 2 | 0 | 2 | 0 | 1.00 |
| last | 0 | 2 | 0 | 2 | 0 | 4 | 0 |
| latter | 3 | 0 | 4 | 0 | 7 | 0 | 1.00 |
| one | 7 | 17 | 8 | 30 | 15 | 47 | .24 |
| other | 33 | 8 | 27 | 4 | 60 | 12 | .83 |
| others | 4 | 6 | 6 | 0 | 10 | 6 | .62 |
| same | 13 | 15 | 4 | 11 | 17 | 26 | .40 |
| Total | 60 | 51 | 52 | 47 | 112 | 98 | .53 |

Obviously, the terms 'former' and 'latter' which have an F.I. of 1.00 will not be tested; nor will 'last' which had an F. I. of 0; nor will 'above' which had only 1 anaphoric use in the set of 600 abstracts.

The remaining four terms - 'one', 'other', 'others' and 'same' have separate rule sets for each term.

# ONE

The term 'one' (including the forms 'ones' and 'one's') has three major senses associated with it. 'One' may be used as: 1) a numeral; 2) a nominal substitute, or; 3) an indefinite pronoun. To determine which of these senses is intended in a piece of text, it is first necessary to understand the detailed structure of a nominal group. (a.k.a. noun phrase)

NOMINAL GROUP

| | | | | | |
|---|---|---|---|---|---|
| logical structure | Premodifiers | | | Head | Post-modifier |
| word classes | determiner | numeral | adjective | noun | prepositional phrase |
| | a | b | c | d | e |

(1) the six red onions on the table
a b c d e

(2) the difficult ones
a c d

(3) one method
b d

(4) one current technique
b c d

(5) that smoking gives one cancer
d

The slot in which the term 'one' occurs within the nominal group will determine which use of 'one' is intended.

## Nominal substitute

If 'one' functions as head (d) of a nominal group premodified by either a determiner (a), e. g. definite article or nominal demonstrative, or an adjective (c) or both, as in (2), the term is being used anaphorically as a nominal substitute. The syntactic environment would be:

premodifier(s) + 'one'

(6) The store had no gold bracelets; just silver ones.
c d

## Indefinite pronoun

In its use as an indefinite pronoun, 'one' is non-anaphoric in that there is no presupposition of a more specified antecedent to which 'one' is referring. Its meaning is that of an indeterminate, generic person who cannot be defined any more specifically within the text.

(7) One never knows what might happen.
d

In terms of the nominal group structure, the indefinite pronoun 'one' has been observed in this data set to occur as the unmodified head (d), as in (5). The form 'one's' is found only in this usage.

Numeral

The most frequent use of 'one' is as a cardinal number. In some instances this sense of 'one' is non-anaphoric. In others, when its use is combined with the linguistic technique of ellipsis, it is anaphoric. The easiest non-anaphoric structure to recognize is the hyphenated combination.

> (8) One-sided sequential tests for the mean of an exponential distribution are proposed.

The remaining occurrences of 'one' is its use as a numeral can be detected by again referring to the nominal group structure. In its un-hypenated numeral uses, 'one' functions as a premodifier in a nominal group, as in (3) and (4). The structural environment would be:

> 'one' + (adjective) + (head) + (prepositional phrase)

In other words, when used as a numeral, 'one' is not preceded by another premodifier, but must be succeeded by at least one and possibly even all of the following:

adjective - c
head noun - d
prepositional phrase - e

> (9) A control function is proposed for one possible system configuration.
> b c
> c d

> (10) The conjecture is shown to be true for one level of 'next' statement.
> b d
> e

> (11) The evaluation of textbooks using one of the standard readability formulae is a lengthy task.
> p
> e

The only exception to this rule as observed in the 600 abstracts, w-as the restrictive adjective 'only' which preceded 'one' twice in the data set, although 'one' was being used as a numeral.

To then determine whether this usage of 'one' is anaphoric or not, the prior text must be scanned for an earlier occurrence of the head noun which 'one' is modifying. If that head noun is specified in greater detail in a prior usage, then 'one' is to be considered anaphoric, since its usage establishes an acceptable environment for some premodifiers to be ellipsed.

> (12a) This is illustrated by a detailed examination of two simple microprocessor-based gaging systems. One system measures location.
> b d

when the anaphoric 'one' is resolved in this usage, the ellipsed premodifiers are re-inserted.

> (12b) This is illustrated by a detailed examination of two simple microprocessor-based gaging systems. $\underset{b}{\text{One}}$ $\underset{c}{\text{simple}}$ $\underset{c}{\text{microprocessor-based}}$ $\underset{c}{\text{gaging}}$ $\underset{d}{\text{system}}$ measures location.

'One' has been observed in this data set to be anaphoric only in the environment:

'one' + head noun

although the inverse of this is not true. That is, all instances of 'one' in this environment are not anaphoric.

## 'SAME'

'Same' occurred in the 600 abstracts a total of 43 times with 17 of these occurrences being anaphoric for an F. I. of .40. 3 of the 4 syntactic environments in which 'same' was observed are always non-anaphoric, while the status of 'same' in the 4th environment depends on prior text.

### Non-Anaphoric

1.

'the' + 'same' + preposition

'or'

'the' + 'same' + .

1. Her responses remained the same throughout the interrogation.

2.

'same' + noun

2. The students interviewed were a very homogenous group - same likes, same dislikes.

3.

'the' + 'same' + adjective + noun

3. The majority of respondents indicated an interest in the same leisure-time activities.

### Dependent on Text

When the following syntax is encountered:

'the' + 'same' + noun

'same' is non-anaphoric if the noun it pre-modifies, or that noun's synonym, was not used earlier in text in a more fully amplified reference.

On the other hand, 'same' is being used anaphorically if the noun it pre-modifies was specified earlier in text in fuller detail. The earlier specification may be in in the form of 1 or more pre-modifiers of the noun, which are ellipsed when 'same' is used in the current reference.

4. Expert searchers used the full-text approach. Novice searchers used the same approach.

Or, the noun used with 'same' may be a rather general term which was explicated earlier in more detail by either a prepositional phrase:

5. Freshmen were most concerned with the problem of having to choose a major. Some sophomores remained disturbed by the same problem.

Or, the earlier reference may have been a detailed explanation not even containing the same general term or its synonym.

6. 15 Subjects were exposed to the stimulus for 4 minutes while 15 Subjects were exposed to the control condition for the same interval.

## 'Other'

'Other' occurred in the 600 abstracts a total of 72 times with 60 of these occurrences being anaphoric for an F. I. of .83.

1. The basic use of 'other' is to make some kind of a comparison, but in most instances the comparison is not as fully spelled out as the underlying meaning intends. The most typical comparisons are of the form:

   (1a) This beer is sold in the U. S. and 14 other countries.

which would be resolved by moving 'other' to a position following the noun, adding the explicit comparative term 'than', and that which is being compared:

(1b) This beer is sold in the U. S. and 14 countries other than the U. S..

The typical syntax for this use would be:

'other' + (adjective) + noun

and tho use is anaphoric in almost all instances except those few where there is no information given as to what the 'other' entity is being compared to:

(2) This beer is sold in 14 other countries.

There are 3 additional possible syntactic environments for the anaphoric use of 'other'.

2. 'Other' may combine with 'each' in a reciprocal reference:

   'each' + 'other'

3. 'Other' may be used as a pronominal in the following syntax:

   'the' + 'other' (not followed by a noun)

   (3a) There are two transformational grammar approaches. The first builds on Chomsky's work and the other follows Postal's model.

which would be resolved as:

(3b) There are two transformational grammar approaches. The first transformational grammar approach builds on Chomsky's work and the other transformational grammar approach follows Postal's model.

4. When the explicit comparatives 'than' or 'while' precede the noun phrase containing 'other', again a comparison is being made, but one which would be resolved differently than is the case in #1.

'than'/'while' + 'the' + 'other' + noun phrase

(4a) Groups of cats, dogs, and rabbits were exposed to the same stimulus. Dogs performed better than the other groups.

which would be resolved as:

(4b) Groups of cats, dogs, and rabbits were exposed to the same stimulus. Dogs performed better than cats and rabbits.

As was pointed out in #1, there is one syntax in which 'other' may be either anaphoric or non-anaphoric, but there is only 1 soley non-anaphoric syntax for 'other':

'other' + 'than'

(5) Universities other than S. U. have an over-emphasis on sports.

## 'OTHERS'

'Others' appeared in the 600 abstracts a total of 16 times with 10 of these uses being anaphoric for an F. I. of .62.

### Non-Anaphoric

When used non-anaphorically, 'others' refers to indefinite individuals whose specific identity is of no concern. The non-anaphoric use of 'others' almost always follows prepositions:

> (1) Concern for others is not highly valued in this society.

### Anaphoric

When used anaphorically, 'others' serves as a pronominal substitute for individuals or items referred to earlier; perhaps even enumerated and has the meaning of 'more like the above'.

> (2) Ss exhibited the defense mechanisms of denial, projection and others.

In this anaphoric use, 'others' either follows 'and' or functions as subject or direct object of the sentence.

## ORDINALS

The ordinals, which are grouped with the nominal substitutes in this study, from 'first' to 'tenth' were observed in the 600 abstracts as follows with an overall F. I. of .25.

| | Psych Abs | | Inspec | |
|---|---|---|---|---|
| | Ana. | Non. | Ana. | Non. |
| first | - | 5 | 8 | 12 |
| second | - | 2 | 3 | 7 |
| third | - | 3 | 1 | - |
| fourth | - | 1 | - | 2 |
| fifth | - | 1 | - | 1 |
| sixth | - | - | - | 1 |
| seventh | - | - | - | - |
| eighth | - | - | - | - |
| ninth | - | - | - | 1 |
| tenth | - | - | - | - |
| Totals | - | 12 | 12 | 24 |

### Non-Anaphoric Use

1. Hyphenated terms in which one term is an ordinal are always nonanaphoric. Some common uses of this type are: 'second-graders', 'first-order calculus', 'one-sixth'. It does happen infrequently that the hyphen is omitted, but the notion intended by the two terms is obviously that of a known hyphenated term.

2. Titles of meetings, books, etc. frequently use ordinals nonanaphorically, e. g. 'Second Edition', 'Eighth Annual Meeting'. Ordinals are also used in less formal titles such as 'fifth generation computers'.

3. The ordinal 'first' functions nonanaphorically as an adverb with the meaning of "before another in time or space or action". Typical syntax for such a use is:

auxiliary verb + 'first' + main verb

(1) Subjects were first tagged and then released to the environment.

or

'at first'

(2) At first, both techniques appeared to work.

or

'First' + complete clause

(3) First, wash your hands.

## Anaphoric Use

Ordinals are always anaphoric when they are intended as the numerative adjective modifying a noun but the noun has been ellipsed and the ordinal therefore functions as the head of the noun phrase. Syntax for such a use would be:

'the' + ordinal (not followed by a noun or adjective)

(4a) Two consumer-oriented evaluation techniques were tested. The first was tried out on suburban housewives.

which would be resolved as:

(4b) Two consumer-oriented evaluation techniques were tested. The first consumer-oriented evaluation technique was tr.ed out on suburban housewives.

## Use Dependent on Text

Ordinals used as numerals in a noun phrase may or may not be anaphoric depending on whether the noun in the phrase has been expressed any more fully in prior text. In the uses observed in the 500 abstracts, all instances of the following syntax where there is an adjective between the ordinal and the noun were non-anaphoric uses.

determiner + ordinal + adjective + noun

(5) The second busiest airport is J.F.K. Airport in New York City.

Those instances in which the ordinal directly precedes the noun it modifies tend to be anaphoric but there are a few exceptions. So when the syntax:

determiner + ordinal + noun

is encountered, prior text will have to be evaluated to see whether the use is anaphoric or not.

(6a) There had been three attempts at in vitro fertilization. The third attempt was successful.

which would be an anaphoric use of an ordinal and would be resolved as:

(6b) There had been three attempts at in vitro fertilization. The third attempt at in vitro fertilization was successful.

## 'DO'

The only true pro-verb in the English language is the verb 'do'. In the 600 abstracts analysed, the verb 'do' appears in all 5 of its possible forms: 'did', 'do', 'does', 'doing' and 'done'. The rules for recognition of anaphoric vs. non-anaphoric use of the verb are written to encompass all forms. When the term 'do' is used in a rule it is to be interpreted as implying all of the possible forms of 'do'. On the other hand, the negative contractions of 'do' will be handled later in the verbal ellipsis class of anaphora, in that the only anaphoric use of these contractions is the elliptical one.

### Non-anaphoric

The verb 'do' has two distinct non-anaphoric uses:

1. Lexical verb - meaning 'to perform' or 'to carry out'. It is always transitive (takes a direct object).

   (1)The subjects did three sets of problems.

   When the past participle form of the verb (done) occurs in this usage, the sentence is in the passive voice and the direct object will precede the verb.

   (2) The assignment was done separately by each of the students.

   When the form 'do' occurs in this usage, the sentence is frequently imperative.

   (3) Do your homework!

2. Periphrastic auxiliary - in this usage, 'do' has no individual meaning but serves as a necessary verbal operator, a purely grammatical element which is required for forming certain cases of a verb, or is added as emphasis in other instances. Periphrastic means to be formed by the use of auxiliaries instead of by inflection of the verb. Compare,

   (4a) She left.

   (4b) She did leave.

   'Do' as a periphrastic auxiliary is used when the main verb is in the simple present or past tense in the following contexts:

   - Interrogative

     (5) Did he stay long?

   - Negative

(6) Dietary treatment did not effect total volume intake.

- Marked/emphatic positive

(7) He did ask her for some assistance.

Anaphoric

The verb 'do' has 3 types of anaphoric usage:

1. Predicate substitute - the verb 'do' can be used to replace a verb or verb clause. In the genre of abstracts this use has been observed to occur in the second of two semantically contrastive clauses conjoined by a comparative term such as 'than' or 'as', and to be followed immediately by the noun phrase which is actually subject of the verb for which 'do' is substituting.

(8a) Freshman reported less change than did seniors.

which would be resolved as:

(8b) Freshmen reported less change than seniors reported change.

2. Ellipsis - verbal ellipsis is actually a special case of predicate substitution where zero substitution occurs rather than lexical substitution. Use of 'do' in verbal ellipsis is decipherable in those sentences where 'do' is retained in its role of periphrastic auxiliary but the main verb is ellided.

(9a) I don't like cheese now but I did when I was a child.

(9b) I don't like cheese now but I did like cheese when I was a child.

The structural environment differs from that of predicate substitution in that 'do' is not followed by the noun phrase which serves as the subject of that verb clause.

3. Complex pro-verb - when combined with 'it', 'so', 'the same', 'this' or 'that', the resulting phrases ('do it', 'do so', 'do the same' , 'do that', 'so doing' and 'do this') function as compound referential verbal groups which together replace an entire predication.

(10) Paul woke up early, had a good breakfast, and left on time for work. Michael did the same.

## INDEFINITES

Of the 33 terms considered by Quirk & Greenbaum to be indefinite pronouns, 25 were observed in the set of 600 abstracts. Of these 25 terms, 14 functioned anaphorically at least once. Therefore, rules to determine whether a term is functioning anaphorically in a specific instance were written for only these 14 terms. The table below provides summary statistics of the indefinite pronouns.

| TERMS | PsychAbs. | | INSPEC | | TOTALS | | |
|---|---|---|---|---|---|---|---|
| | Ana. | Non. | Ana. | Non. | Ana. | Non. | F.I. |
| UNIVERSALS | | | | | | | |
| each | 29 | 28 | 17 | 24 | 46 | 52 | .47 |
| all | 14 | 26 | 7 | 17 | 21 | 43 | .33 |
| every | - | 2 | - | 4 | - | 6 | 0 |
| everything | - | - | - | - | - | - | - |
| UNIVERSALS TOTALS | 43 | 56 | 24 | 45 | 67 | 101 | .40 |
| ASSERTIVES | | | | | | | |
| many | 2 | 10 | 1 | 14 | 3 | 24 | .11 |
| more | 39 | 49 | 11 | 11 | 50 | 60 | .46 |
| most | 2 | 29 | 1 | 8 | 3 | 37 | .08 |
| much | 3 | 4 | 1 | 2 | 4 | 6 | .40 |
| few | - | 6 | - | 4 | - | 10 | 0 |
| fewer | 1 | 9 | - | - | 1 | 9 | .10 |
| little | - | 4 | - | 1 | - | 5 | 0 |
| least | - | 8 | - | 6 | - | 14 | 0 |
| less | 10 | 22 | - | 4 | 10 | 26 | .28 |
| several | - | 9 | - | 30 | - | 39 | 0 |
| enough | - | 1 | - | - | - | 1 | 0 |
| some | 1 | 26 | 1 | 50 | 2 | 76 | .02 |
| someone | - | - | - | - | - | - | - |
| something | - | 3 | - | - | - | 3 | 0 |
| ASSERTIVES TOTALS | 58 | 180 | 15 | 130 | 93 | 310 | .19 |
| NON-ASSERTIVES | | | | | | | |
| any | 2 | 7 | - | 15 | 2 | 22 | .08 |
| anyone | - | 1 | - | 1 | - | 2 | 0 |
| anything | - | 1 | - | - | - | 1 | 0 |
| either | 20 | 12 | 2 | 3 | 22 | 15 | .59 |
| NON-ASSERTIVES TOTALS | 22 | 21 | 2 | 19 | 24 | 40 | .38 |
| NEGATIVES | | | | | | | |
| no | 3 | 58 | 2 | 13 | 5 | 71 | .06 |
| none | - | 1 | 1 | 1 | 1 | 2 | .33 |
| nothing | - | 1 | - | - | - | 1 | 0 |
| neither | 2 | - | - | 1 | 2 | 1 | .66 |
| NEGATIVES TOTALS | 5 | 60 | 3 | 15 | 8 | 75 | .10 |
| GRAND TOTALS | 128 | 317 | 44 | 209 | 172 | 526 | .25 |

## 'EACH'

'Each' is the second indefinite pronoun of the universal subclass to be considered. 'Each' is similar to 'all' in that its anaphoric use can be determined by syntax only some of the time. In the remaining instances, it is the prior text that will determine whether its use is anaphoric or not.

'Each' has three anaphoric uses:

- 'each other' functions as an anaphoric reciprocal pronoun.

  (1) The sensitized Ss were more likely to initiate conversation with each other than with nonsensitized Ss.

- 'each' functions as the head of a nominal group and in this use has been observed only in the following syntactic environment:

  'each' + verb form

  (2) 117 first-grade children were tested on the apparatus and the first two trials completed by each were recorded.

- 'each' + preposition other than 'of' (e.g. at, under, within)

  (3) Ss were 24 children, 12 each at the two levels tested.

The one syntactic environment in which 'each' invariably functions non-anaphorically is:

'each of'

Although the noun phrase following 'each of' is itself frequently anaphoric (e.g. 'each of these', 'each of which'), the term 'each' serves as a nonanaphoric quantifier meaning 'each and every one of the following entities'.

(4) Each of these functions is described in detail.

In its remaining occurrences, 'each' functions as a determiner in either of two syntactic environments:

'each' + noun

'each' + adjective + noun

In these environments, the prior text must be consulted to see whether the noun has been more fully specified in an earlier occurrence. 58 of the 98 occurrences of 'each' in the 600 abstracts are of this type which requires more than recognition of a particular syntax. The situation is further complicated by the fact that the noun which 'each' serves as a determiner for, may not be the same word as used originally, but rather a paraphrase, a semantically related word such as a synonym or general noun.

> (5) Surveyed 1,689 adult married females to examine media-exposure patterns. Each respondent was classified as....

If the noun that 'each' is serving as a determiner for, is a paraphrase of, or repetition of a more fully specified noun, then 'each' is serving an anaphoric function. Otherwise, not.

An exception to this rule is the noun phrase 'each S' since 'S' will be judged anaphoric/nonanaphoric in its own right, and each therefore serves simply as a nonanaphoric quantifier.

## 'ALL'

'All' is an indefinite pronoun of the subclass termed universal. Its basic definition is "every member or individual component of". 'All' has 3 basic uses:

1. When occurring in the phrase 'all that', the reference is non-anaphoric in that it is an indeterminate reference to entities which are presumed to exist but are not specified, much the same as other double pronouns such as 'those who' or 'that which' have indeterminate reference.

   (1) All that was needed was provided by the instructor.

2. 'All' functions anaphorically as an independent nominal head. in the following syntactic environments:

   - 'all' + verb form

     (2) 13 retarded children and 14 children with average IQ's were tested. All were administered the same pretest.

   - 'all' + prepositions other than 'of' (e.g. 'but', 'under', 'within')

     (3) The algorithms developed are all within the capabilities of the current system.

   - 'all' + adjective not followed by a noun

     (4) Paradoxically, suggestions for eliminating the delivery service, improving the service, or updating its mode were helpful to consider and all reasonable from the financial point of view.

3. 'All' may function as an element other than head of a nominal group. As such, 'all' may be either anaphoric or non-anaphoric based in some instances on which elements of the nominal group follow the term, and in other instances on the prior text.

   Firstly, 'all' functions non-anaphorically when it occurs as a predeterminer/quantifier in nominal groups of the following structures:

   - 'all' + 'of' + noun phrase

     (5) All of the test results were distributed first to the program coordinator.

   - 'all' + determiner (e.g. 'the', 'this', 'such', 'their') + noun phrase

     (6) All their work was for nought.

- 'all' + adjective + noun

  (7) All necessary adjustments were worked out prior to the test run.

In the following 2 nominal group structures, 'all' may be either anaphoric or nonanaphoric and the decision as to which, will be based on the semantics of the preceding text:

- 'all' + noun

  (8) All books were returned to the library prior to the new semester.

- 'all' + numeral + noun phrase

  (9) All 50 states have their own welfare assistance programs.

Where ['all' + noun] is the structure, if this is the first occurrence of the noun, 'all' will be a nonanaphoric quantifier and likely a rather generic reference, such as "all men". If it is not the first occurrence of the noun and the noun is more specified (either by premodifiers or postmodifiers) in a prior occurrence in the text, then the use is anaphoric. However, if the noun is not any more fully specified in prior use(s), then it is nonanaphoric.

In that 'all' is what is known as a congretory quantifier, it appears to perform as an anaphoric direction to readers to reassemble and enumerate all subgroups that may have been separated out in prior text. This occurs most frequently when 'all' precedes 'Ss' or general nouns such as "all groups" or "all 4 categories".

(10) 32 Ss were assigned to either progressive relaxation (PR), clinically standardized meditation (SM), or a waiting list control group (CG). At the end of a 5 week period all Ss were exposed to 6 very loud tones. All 3 groups exhibited higher heart rates.

In the above example, both "all Ss" and "all 3 groups" would be resolved by reiterating the 3 groups into which the Ss had been subdivided. The prior text will dictate whether the 'all' is anaphoric or not, for in some instances the Ss will not have been subdivided and therefore only the term Ss is anaphoric, e. g.:

(11) Investigated the possible influence of 48 hours of sleep deprivation (SD) in 12 19-30 year old males. Following SD, all Ss showed marked reduction of DNA synthesis.

## 'MANY'

'Many' is an indefinite pronoun of the multal subclass. It occurred in the 600 abstracts a total of 27 times with only 3 of these instances anaphoric for an F.I. of .11.

Although there exist several possible uses of 'many', only rules for the one observed use will be included here since our rule-writing is data-driven rather than theory-driven.

The only observed use of 'many' was as an adjective with the meaning - "a large but indefinite number". In this use, 'many' was observed in three different syntactic environments. In the first two, the observed uses were always nonanaphoric:

'many' + adjective + noun

(1) Decisions were made based on <u>many</u> previous cases.

and

'many' + 'of'

(2) Males have <u>many</u> of the same characteristics as females.

In the third observed environment:

'many' + noun

the prior text must be checked to see whether the noun that 'many' is modifying is specified previously in any greater detail.

(3a) Research was conducted on a variety of response-specific stimuli. <u>Many</u> stimuli were found to be more effective on immature cells than on fully developed ones.

(3b) Research was conducted on a variety of response-specific stimuli. <u>Many response-specific stimuli</u> were found to be more effective on immature cells than on developed ones.

# 'MORE'

With analysis of the term 'more', we encounter for the first time consideration of those types of words which serve as clues to ellipsis rather than serve as anaphors themselves. All of the terms we are analyzing in this project, when they function in a way of interest to us, will function either as:

1. Terms which are lexical anaphors, that is, place-holders to be replaced by terms used in prior text. Pronouns and nominal substitutes are prime examples.

2. Terms which serve as clues to the fact that words have been ellipsed in text. The term which serves as the clue is not itself replaced, but portions of the prior text are added to the sentence containing the clue word.

'More' is an indefinite pronoun of the multal subclass, which it shares with 'many', 'most' and 'much'. 'More' was observed in the 600 abstracts a total of 109 times. 49 of these occurrences were anaphoric for an F. I. of .45.

In all its uses, presence of the term 'more' implies the basic notion that a comparison of some type is being made. The type comparison being made will determine whether the use is always anaphoric; always nonanaphoric; or dependent on the specifics of the text.

## DEPENDENT ON TEXT

### Clausal

The most common comparison is between two clauses. The co-occurence of 'more' and 'than' within the same sentence establishes the necessary environment for clausal comparison although 'more' and 'than' need not be contiguous. 'More', which is considered the comparative element, together with 'than' forms a hinge by which the two clauses coalesce to form a comparative construction. The two clauses are intended to be semantic equivalents with the exception of one element which provides the contrast or comparison between the two clauses. The two clauses are closely parallel, both in structure and content. As a result, it is common practice to elide rather than repeat some portion of what the second clause has in common with the first clause. If there is this ellipsis, then for our analysis, 'more' is to be attributed with being the lexical trigger for the ellipsis. The term 'more' itself is not replaced with a term, but it serves as a structural clue that a clausal comparison is being made and that the structure of both clauses should be parallel.

Therefore, when 'more' and 'than' co-occur in a sentence, that sentence's two clauses must be compared to check whether the structures of the two clauses are completely parallel or whether some terms have been ellipsed. If there has been some ellipsis, which syntactic items have been elided may vary. For example, in sentence (1a) the verb and object of the second clause have been ellipsed:

(1a) It was found that firstborns showed more death threat than lateborns.

(1b) It was found that firstborns showed more death threat than lateborns showed death threat.

while in (2a) the subject and verb hava been ellipsed:

(2a) Those with depression were more likely to have received diazapam than antidepressants.

(2b) Those with depression were more likely to have received diazapam than those with depression were likely to have received antidepressants.

Note that in resolving the ellipsis the term 'more' is not carried forward and re-used with the other terms in the 2nd clause.

However, it is not to be assumed that <u>all</u> sentences with co-occurrences of 'more' and 'than' have some elements elided, but rather the presence of those terms requires that the structure be checked for exact parallel construction.

It does occur somewhat infrequently (4 out of 45 ellipses) that the ellipsis appears to be both cataphoric and anaphoric, with some words from prior text and some words from later text used to flesh out a completely parallel structure. We will consider these occurences anaphoric in that both the anaphoric and cataphoric ellipses need be resolved.

(3a) The examples given indicate that younger Ss made more false than true conclusions.

(3b) The examples given indicate that younger Ss made more false conclusions than younger Ss made true conclusions.

When comparing the clauses for parallel structure, all other anaphors must be resolved first to insure that two different words are not credited with creating the same elliptical situation. This is particularly important if the verb of the second comparative clause is a form of the proverb 'do', as seen in (4a) where the verb 'did' functions as a predicate substitute for the entire verbal clause. In this sentence, therefore, 'more' will not be considered a clue to anaphoric ellipsis.

(4a) Fourth-graders made significantly more female designations among adult-specified females than did preschoolers.

(4b) Fourth-graders made significantly more female designations among adult-specified females than preschoolers made female designations among adult-specified females.

### Quantifier

When used as a quantifer, 'more' means "an additional amount of things, persons, time, etc." and directly precedes the noun phrase it modifies.

'more' + noun phrase

(5) Results show more emphasis on the informational aspects.

Whether the use is anaphoric or not will depend on whether the noun phrase it is modifying is specified any more extensively in prior text.

## ANAPHORIC

### Numeric Comparison

When a comparison is made between an absolute numeric value and its comparative form (e. g. 'two or more than two'), the text is frequently abbreviated to:

numeral + 'or more' + noun/adjective + noun

This use is a clue to another instance of anaphoric ellipsis in that 'than + numeral' have been ellipsed.

(6a) Ten or more instances of tardiness will result in suspension.

which would be resolved as:

(6b) Ten or more than ten instances of tardiness will result in suspension.

## NON-ANAPHORIC

### Explicit Standard

When the comparison is being made between some entity and an explicit standard rather than between two clauses, 'more' will directly precede 'than' and be followed by some specific numeric measure. 'More' is never anaphoric in this use.

(7) The average bear weighs more than 2000 pounds.

### Intensifier

'More' is used as an intensifier to form the comparative form of both adjectives and adverbs which it premodifies. The adjective or adverb must be of the gradable type, that is, it must be an attribute that may be present to varying degrees. When functioning as an intensifier, 'more' is nonanaphoric. The syntactic environment in which this use of 'more' is found is either:

'more' + gradable adjective

(8) Patients with low MHPG levels are more responsive to treatment with drugs that inhibit norepinephrine uptake.

or

'more' + gradable adverb

(9) Change towards increased assertiveness is more likely to occur when clients realistically assess the possibilities open to them.

The intensifier use occurs only in those sentences in which 'than' does not co-occur with 'more'. Even if 'more' premodifies a gradable adjective, if 'than' is also present, the use of 'more' is to be catagorized as a clausal comparative.

The reason 'more' without 'than' cannot be interpreted as a lexical clue to ellipsis, is that since the writer did not indicate by use of 'than' on what parameter the comparison was to take place, there is more than one interpretation possible and we cannot assume what was intended. For instance in the following piece of text, the comparison is ambiguous because there is no 'than'.

(10) Imagery theory is more of a theory of problem solving and is best examined through the measure of error rate. Linguistic theory is more a measure of sentence processing and is best measured using latencies.

## 'MOST'

'Most' is an indefinite pronoun of the multal subclass. 'Most' occurred 40 times in the set of 600 abstracts with only 3 of these occurrences being anaphoric for an F.I. of .075.

In that some uses of 'most' were so infrequent as to be singular in their occurrence, rules have not been developed for all observed uses, but rather, in some instances the observed syntactic environment is simply described.

'Most' has four basic functions:

**Superlative:** 'Most' is used to create the superlative form of both adjectives and adverbs. The meaning of 'most' in such instances is "to the greatest or highest degree". When used to form the superlative of an adjective, one basic syntactic environment would be:

'the' + 'most' + adjective + noun

(1) Short-term instabilities are the most important source of error.

In such a syntactical context, 'most' is non-anaphoric. If, however, the adjective is not followed by a noun:

'the' + 'most' + adjective

the term 'most' is to be considered anaphoric in that it serves as a lexical clue to the ellipsis of the noun.

(2) Six environments were tested for conduciveness to study. Low heat and high light were found to be the most conducive.

Another syntactic environment for 'most' when it forms the superlative of an adjective is basically the same as that used by 'most' to form the superlative of an adverb, and in all instances it is non-anaphoric.

verb 'to be' + 'most' + adjective/adverb

(3) To determine which of several methods was most effective, a series of tests was run.

(4) Short-answer questions are most often inappropriately answered.

**Quantifier:** 'Most' is used as an indefinite quantifier of mass nouns and plural count nouns, where its meaning is, respectively, "greatest amount of" and "greatest number of". In such uses, 'most' is distinguished from its superlative use, by the fact it is not preceded by 'the'.'Most' is nonanaphoric when it occurs in either of the two most frequent syntactic environments for 'most' as a quantifier:

'most' + noun/adjective + noun

(7) By following the Pritkin diet, most overweight teenagers lost 10-15 pounds.

or

'most' + 'of'

(8) Most of the students passed the final exam.

However, if the noun which 'most' is quantifying is ellipsed, the use is anaphoric.

'most' + verb

(9) Fifty attendees were bunked together. Most enjoyed the experience.

Noun: 'Most' was observed once in its use as a noun, where the meaning is "the greatest amount", as distinguished from its meaning as a quantifier - "the greatest amount of Its syntax is:

'the' + 'most

(10)Its the most I can get for the car.

Adverb: 'Most' may itself be used as an adverb, not just to form the superlative of an adverb. In such use, 'most' is nonanaphoric and has been observed once in each of the following syntactic environments:

- As an interposing element causing a split infinitive:

'to' + 'most' + verb

(5) The drug was shown to most effect results in premature babies.

- As a displaced adverb:

verb + direct object + 'most'

(6) She baked pies most during the winter months.

## 'MUCH'

'Much' is another of the indefinite pronouns of the multal subclass. 'Much' occurred a total of 10 times in the 600 abstracts, with 4 of these occurrences being anaphoric for an F.I. of .40. 'Much' was observed in 4 distinct usages. The first use is dependent on prior text to determine whether it is anaphoric or not, while the latter 3 uses are nonanaphoric in all observed instances.

- Clausal comparative

With analysis of 'much' we encounter a 2nd term which frequently serves as a lexical clue to the fact that some words in text have been ellipsed. 'More' is the other term which performed the same function. Both terms are used in comparing two clausal constructions which are semantically parallel. Since the 2nd clause, if fully fleshed out, would be a syntactic duplicate of the first clause, it is common practice to ellide rather than repeat some portion of the common structure.

The syntactic environment in which 'much' functions as this lexical clue to ellipsis is:

'much' + adjective + 'than'

or

'much' + adverb + 'than'

'Than' may or may not immediately follow the adjective or adverb, but the presence of 'than' is essential to indicate that in fact a comparison is being made.

When these particular syntactical environments are encountered in text, it is necessary to check whether the structures of the two clauses are completely parallel or whether some terms have been ellipsed.

(1a) First-borns responded to the anxiety stimulus much differently than later-borns.

(1b) First-borns responded to the anxiety stimulus much differently than later-borns responded to the anxiety stimulus.

In those instances where some text has been ellipsed in the second comparative clause, the use of 'much' will be considered anaphoric, while if no terms have been ellided, the use is non-anaphoric.

The one exception is when 'much' premodifies another term of the class of indefinite pronouns which is itself being used to form the comparative form of the adjective or adverb, e. g.

'much' + 'more' + adjective + 'than'

(2) Ineptitude was <u>much</u> more difficult to pretest for than was disinterest.

When double indefinites occur, the first indefinite is to be thought of as an intensifier and non-anaphoric in all occurrences, while the second indefinite pronoun will be attributed with being the lexical trigger for ellipsis.

- Intensifier

'Much' operates as an intensifier when it precedes an adjective but the clausal hinge 'than' is absent from the construction. In such a use, 'much' is non-anaphoric. The syntactic environment would be:

'much' + adjective + noun

(3) Earlier in his career, Watson had <u>much</u> loftier goals.

- Adjective

'Much' can also function as a simple adjective with the meaning "great in quantity, amount, extent, or degree". Such a use is nonanaphoric and was observed once in the following syntax:

'much' + noun

(4) There is <u>much</u> truth in what you say.

- Noun

'Much' was also oberved once in its nonanaphoric role as a noun in the following context:

verb + 'much' + infinitive clause

(5) His excuse left <u>much</u> to be desired.

## PAUCALS

The group of indefinite pronouns known as the paucal subclass, consists of the terms: few, fewer, fewest, little, less, and least.

This group was distributed in the 600 abstracts as follows:

| | Psych Abs | | Inspec | | Total | | |
|---|---|---|---|---|---|---|---|
| | Ana. | Non. | Ana. | Non. | Ana. | Non. | F. I. |
| few | - | 6 | - | 4 | - | 10 | 0 |
| fewer | 1 | 9 | - | - | 1 | 9 | .10 |
| fewest | - | - | - | - | - | - | - |
| little | - | 4 | - | 1 | - | 5 | 0 |
| less | 10 | 22 | - | 4 | 10 | 26 | .28 |
| least | - | 8 | - | 6 | - | 14 | 0 |

A full linguistic analysis , including rule-testing, will be performed only on the term 'less', and the single anaphoric instance of 'fewer' simply described.

### 'Fewer'

The single anaphoric use of 'fewer' occurred in a sentence composed of two semantically parallel clauses, where the co-occurrence of 'fewer' and 'than' provided the syntactic environment permitting some lexical elements of the second clause to be elided. Therefore, 'fewer' served as a lexical clue to ellipsis and is attributed with anaphoric status. This is the same basic usage observed with the other two paucal comparatives: 'more' and 'less'.

## 'LESS'

'Less' is an indefinite pronoun of the paucal subclass. It occurred 36 times in the 600 abstracts with 10 of these uses being anaphoric for an F.I. of .28.

'Less' has 4 specific uses. Two of these uses may be anaphoric or not depending on prior text, while the other two uses are always nonanaphoric.

### DEPENDENT ON TEXT

#### Comparative

When 'less' and 'than' co-occur in a sentence, the environment exists for a comparison to be made between two entities or two clauses. If the comparison is between clauses, the common practice is to ellide some portion of the second clause which is simply a repetition of elements of the first clause. If this type ellipsis occurs, 'less' is to be attributed with being the lexical clue for ellipsis and therefore anaphoric. If, however, the second clause is completely parallel with the first and no words have been ellided, the use of 'less' is nonanaphoric.

The syntax for such a comparative use is:

'less' + ______ + 'than'

where what occurs between the 'less' and the 'than' is highly variable, but the presence of both predicts this usage. When this syntax is encountered, the second clause must be checked for complete syntactic parallelism with the first clause.

(1a) Firstborns reported less death-threat concern than other groups.

which would be resolved as:

(1b) Firstborns reported less death-threat concern than other groups reported death-threat concern.

The one exception to this rule is the idiomatic phrase 'less than' followed by some adjectival form, e.g.:

(2) He was less than honest.

where the true meaning of 'less than' is "by no means". The syntactic environment for this exceptional use is:

'less than' + adjective

If 'less than' is not followed by an adjective, it is to be treated the same as in the clausal comparative usage and the clause that follows 'less than' is to be examined for complete parallel structure with the first clause.

### Quantifier

When used as a quantifier, 'less' precedes a noun phrase, which may consist of either:

'less' + noun

or

'less' + adjective + noun

and the term 'than' does not co-occur. In this usage, however, the adjective will not be of the gradable type, which it is in the negative comparative use. Whether the use is anaphoric or not will again depend on whether the noun that 'less' modifies is specified any more extensively in prior text.

(3) Experienced programmers required less warm-up time to score highly.

## NON-ANAPHORIC

### Negative comparative

'Less' combines with gradable adjectives and adverbs to form their negative comparative form. Gradable refers to an attribute that may be present in varying degrees. In this usage, 'than' never occurs in the construction, which consists of:

'less' + adjective

or

'less' + adverb

(4) Urban lots are considered to be less stable in the current real estate market.

## ADVERB

As an adverb, 'less' serves as a "downtoner", lowering the effect of the force of the verb. The syntactic environment for such usage would be:

verb + 'less'

or

verb + direct object + 'less'

In some of its other uses, 'less' may also follow the verb, but in those uses, 'less' would be followed by either an adjective, adverb, noun, or 'than'. When used as an adverb, 'less' is not followed by any of these, and either ends the sentence or is followed by a prepositional phrase.

(5) Students cheated less when dual monitoring devices were used.

## 'SOME' - group

Of the 'some' group of indefinite pronouns, 'somebody' and 'someone' never occur in the sample set of 600 abstracts, while 'something' only occurs 3 times and is non-anaphoric in each usage. Only 'some' was observed in any anaphoric uses. 'Some' occurred 78 times in the 600 abstracts, with only 2 of these instances being anaphoric for an F.I. of .02.

### Non-anaphoric

The major role of 'some' is to serve as a quantifier/ determiner of a noun phrase. In such usage, its meaning is "an unspecified amount or number". 'Some' may immediately precede the noun phrase:

'some' + noun phrase

(1) Some computer-aided design programs are described and illustrated with examples.

or take the of-construction:

'some' + 'of' + noun phrase

(2). Each area is described detailing some of the major proposed solutions to the proposed therein.

### Anaphoric

It is possible for the noun phrase which 'some' is serving as determiner for, to be ellipsed. In such a usage, 'some' is anaphoric. The possible syntactic environment for such a use would be either:

'some' + verb phrase

or

'some' + preposition (other than 'of')

(3) The answers were incorrect for a number of reasons. Some were incomplete and some simply wrong.

## 'ANY' - group

Of the 'any' group of indefinite pronouns, 'anybody' never occurred in the sample set of 600 abstracts. 'Anyone' only occurs twice and 'anything' once. None of these occurrences are anaphoric. 'Any' occurred 24 times, with only 2 on these instances being anaphoric for an F.I. of .08.

### ANY

'Any' serves as a quantifier/determiner of a noun phrase and the question of whether the usage is anaphoric or not is answered only by examining prior text to see if the noun that 'any' is modifying is specified earlier in any greater detail.

## 'EITHER'

'Either' occurred in the 600 abstracts a total of 37 times with 35 of these occurrences being anaphoric for an F.I. of .95. 4 of the 35 anaphoric occurrences were lexical anaphors and the remaining 31 anaphoric uses of 'either' were as lexical clues to ellipsis.

## ANAPHORIC

### Coordination

The major function of the term 'either' is as an anticipator of a coordinated construction in which the actual coordinator term is 'or'. 'Either - or' may be used to coordinate within phrases or across phrases and clauses, and in both environments 'either' is considered a lexical clue to anaphoric ellipsis.

**Phrasal Coordination:** The usual syntax for within-phrase coordination is either:

'either' + adjective + 'or' + adjective + noun

(1a) Subjects delivered a prepared speech on either a sexual or a non-sexual topic.

which would be resolved as:

(1b) Subjects delivered a prepared speech on either a sexual topic or subjects delivered a prepared speech on a non-sexual topic.

and perhaps more naturally rephrased as:

(1c) Either subjects delivered a prepared speech on a sexual topic or subjects delivered a prepared speech on a nonsexual topic.

or

form of verb 'to be' + 'either' + adjective + 'or' + adjective

where the attributes expressed by both adjectives are being predicated of the same noun phrase which precedes the verb form of 'to be'.

(2a) Stimuli were either sweet or sour.

which would be resolved as:

(2b) Stimuli were either sweet or stimuli were sour.

and more naturally rephrased as:

(2c) Either stimuli were sweet or stimuli were sour.

**Clausal coordination:** All other co-occurrences of 'either' and 'or' which do not fit the two syntactic environments described above, will be instances of clausal coordination. Typical use might be:

(3a) The disease either responded paradoxically to treatment or continued to produce severe symptoms.

which would be resolved as:

(3b) The disease either responded paradoxically to treatment or the disease continued to produce symptoms.

and more naturally rephrased as:

(3c) Either the disease responded paradoxically to treatment or the disease continued to produce symptoms.

### Determiner

'Either' may function as determiner of a noun phrase and is always anaphoric in such usage. The environment for such use would be the non-occurrence of the term 'or' within the same sentence and the syntax:

'either' + noun phrase

(4) In the second experiment, codeine and demerol were tested. Either drug was found to produce significant side effects.

## NON-ANAPHORIC

### Nominal

'Either' may function as a nominal, meaning "one or the other". In such a use, 'either' has been nonanaphoric in each occurrence in the test set. When functioning as a nominal, 'either' occurs in a sentence without 'cr' and in the following syntax:

'either' + 'of' + noun phrase

(5) Subjects were placed in either of two conditions.

## NEGATIVES

There are five negative indefinite pronouns - 'no', 'none', 'nobody', 'nothing' and 'neither'. In the set of 600 abstracts these terms occurred as follows:

'nobody' - no occurrences
'nothing' - one non-anaphoric occurrence
'none' - 3 occurrences: 1 anaphoric, 2 nonanaphoric
'neither' - 3 occurrences: 2 anaphoric, 1 nonanaphoric
'no' - 76 occurrences: 5 anaphoric, 71 nonanaphoric

Rules for 'none' and 'neither' can be easily generated from earlier rule sets written for similarly functioning terms. 'No' is the only negative which occurred sufficiently frequently to warrant a full-scale analysis.

### 'NONE'

'None' had two distinct uses in the abstracts. The rules governing whether the use was anaphoric or not are the same syntax-matching rules as used for the terms 'most', 'all' and 'each'.

'None' is non-anaphoric in the syntax:

'none' + 'of' + noun phrase

(1) None of the essay questions were responded to in sufficient detail.

'None' serves as a clue to anaphoric ellipsis in the syntax:

'none' + verb form

(2) Three indexing techniques were tested. None improved the results significantly.

### 'NEITHER'

The two distinct uses of 'neither' were exact syntactic matches to two of the uses that 'either' is put to. Namely, 'neither' is used as a determiner and is anaphoric in the syntax:

'neither' + noun phrase

(3) Subjects were assigned to a control group or the experimental group. Neither group performed exceptionally well.

'Neither' is used as a nominal with the meaning "not one or the other" and is nonanaphoric in the syntax:

'neither'.....+ 'of' + noun phrase

(4) Neither of the fires resulted in any loss of life.

'NO'

'No' occurred a total of 76 times in the 600 abstracts with only 5 of these occurrences being anaphoric for an F.I. of .06.

The one possibly anaphoric use of 'no' is dependent on prior text. The syntax for such use would be:

'no' + noun

where the anaphoric/nonanaphoric decision depends on whether the noun that 'no' is serving as determiner for is specified in any greater detail earlier in text.

(1a) Threshold-raising techniques have been under development for several years. Nc techniques have yet met the design criteria.

which would be resolved as:

(1b) Threshold-raising techniques have been under development for several years. No threshold-raising techniques have yet met the desigr criteria.

'No' is always non-anaphoric when premodifying either an adjective:

'no' + adjective + noun

(2) No significant effects were found for birth-status alone.

or an adverb:

'no' + adverb

(3) Physicians believe that quarantine is no longer necessary for victims of tuberculcsis.

## Residual Adjectives

The 6 remaining P.A.'s that function frequently as adjectives were analyzed with the following results:

| | P.A. | | INSPEC | | TOTALS | | |
|---|---|---|---|---|---|---|---|
| term | Ana. | Non. | Ana. | Non. | Ana. | Non. | F.I. |
| additional | 0 | 2 | 1 | 3 | 1 | 5 | .16 |
| another | 2 | 3 | 1 | 3 | 3 | 6 | .33 |
| both | 18 | 36 | 1 | 25 | 19 | 61 | .24 |
| else | 0 | 0 | 0 | 1 | 0 | 1 | .00 |
| equal | 0 | 5 | 0 | 1 | 0 | 6 | .00 |
| identical | 0 | 2 | 0 | 1 | 0 | 3 | .00 |

Since 'else', 'equal', and 'identical' never functioned anaphorically and 'additional' functioned anaphorically only once, no further description of their usage will be presented, nor will they be tested.

### Another

'Another' may function in one of three ways:

Non-anaphoric: 'Another' is always non-anaphoric when used to refer to some indeterminate human referent who is presumed to exist but not specified in the text.

(1)Forgiveness of another brings peace of mind.

Dependent-on-text: 'Another' is potentially anaphoric when it serves as modifier in a noun phrase. Whether it is anaphoric or not depends on whether the noun it modifies has been specified in greater detail earlier in text.

(2) There are a variety of ballet styles currently in vogue. One ballet style is the classical and another style is the minimalist.

Anaphoric: 'Another' is always anaphoric when the noun it is intended as modifier for, has been ellipsed.

(3) It has become increasingly difficult to tell one book from another.

### Both

'Both' has 2 non-anaphoric uses and 2 anaphoric uses.

Non-anaphoric

The most common use of 'both' is in conjunction with 'and' in what is known as a combinatory coordination. 'Both' is used to stress the inclusion of each of the 2 words or phrases being coordinated. The occurrence of the following syntax always indicates this use:

'both'.......'and'

where the text which separates the 2 terms may be as short as one word or as long as a full phrase.

(4) Both the automaton and its reversal are strongly connected.

or

(5) Constructive assertive alternatives are developed that integrate both the task and feelings.

When 'both' combines with 'of', it again stresses inclusion of each of the items which follow 'of'. 'Both' is always non-anaphoric in such use, although the term or phrase following 'of' is frequently anaphoric.

'both' + 'of'

(6) Both of these techniques have been used in earlier research in content analysis.

Anaphoric

'Both' was observed to function anaphorically in every instance where it served as premodifier in a noun phrase. This use can be recognized by absence of 'and' from the construction and one of the following syntactic patterns:

'both' + noun

(7) Rats and gerbils were tested in the mazes. Both species improved performance following reinforcement trials.

'both' + adjective + noun

(8) Pre-adolescent females and adolescent males were observed in their school settings. Both target groups exhibited self-conscious behavior when advised of the possible observations.

'Both' functions anaphorically when it serves as a pronominal, taking the place of two items referred to earlier in text. In this usage, 'both' occurs wherever a noun might occur and has cbserved in the following two patterns:

'both' + verb

(9) Red and yellow were chosen as the stimulus colors. Both elicit similar emotional responses in subjects.

preposition + 'both' (not followed by adjective or noun)

(10) Heavy smokers and frequent drinkers were chosen as subjects. Lack of interest in nutritional concerns has been observed in both.

## Adverbs

The linguistic analysis of the 10 adverbs which occur in the set of 600 abstracts has been completed with the following summary results:

| | P.A. | | Ins. | | | Total | |
|---|---|---|---|---|---|---|---|
| | Ana. | Non. | Ana. | Non. | Ana. | Non. | F.I. |
| here | 0 | 2 | 1 | 2 | 1 | 4 | .20 |
| identically | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| similarly | 1 | 1 | 0 | 0 | 1 | 1 | .50 |
| so | 3 | 8 | 0 | 15 | 3 | 23 | .12 |
| such | 16 | 17 | 20 | 27 | 36 | 44 | .45 |
| then | 1 | 14 | 1 | 24 | 2 | 38 | .05 |
| there | 0 | 36 | 1 | 24 | 1 | 60 | .02 |
| therein | 0 | 0 | 1 | 0 | 1 | 0 | 1.00 |
| thus | 0 | 10 | 0 | 3 | 0 | 13 | 0 |
| vice versa | 1 | 0 | 0 | 0 | 1 | 0 | 1.00 |
| Total | 22 | 88 | 24 | 96 | 46 | 184 | .20 |

As can be seen by these figures, only 'so' and 'such' demand that rules be written to determine anaphoric from nonanaphoric occurrences. 'Then', with 2 anaphoric occurrences could possibly have rules written, but the single occurrence in each database does not appear to offer any patterned use.

## "SO"

'So' occurred a total of 26 times in the 600 abstracts. 15 of these occurrences were in the INSPEC abstracts and all 15 occurences were non-anaphoric. Of the 11 occurrences of 'so' in PSYCH ABS, 3 instances were anaphoric. Total F. I. over 2 databases was 12%. Rules will be written based on the uses of 'so' in just the PSYCH ABS database.

### Non-Anaphoric

1. 'So' combines with 'that' to introduce a clause expressing purpose or result. Syntax would be:

'so' + 'that'

(1) The velocity of a trolley must be controlled so that the swing of its grab vanishes when the trolley arrrives at a goal position.

2. 'So' combines with foms of the verb 'do' to form a complex anaphoric pro-verb. For this tabulation of anaphoric terms, 'so' in such use will not be counted as anaphoric since in each instance, 'do' has already been credited with anaphoric function. Resolution of the complex pro-verb 'do' reinserts those terms which 'so' substitutes for.

form of 'do' + 'so'

(2) Paul has already registered for the new semester and Gene will do so soon.

3. 'So' functions non-anaphorically as an intensifier of either an adjective or adverb, and has the meaning "to a great extent or degree". Recognizable syntax would be:

'so' + adjective/adverb

(3) The children were so eager to begin that to wait would have been foolish.

### Anaphoric

In all remaining observed instances of use, 'so' functioned as a pro-adverbial. In such uses, its meaning is "such as has been specified or suggested" earlier in text. The contextual syntax of such use was varied in that 'so' can replace an adverb or a whole clause.

(4) They asked whether we were going to the concert. If so, they wanted to go with us.

## 'SUCH'

'Such' occurred in the set of 600 abstracts a total of 80 times with 36 of these occurrences being anaphoric for an F. I. of 45%. 'Such' has 2 consistently non-anaphoric uses, 2 consistently anaphoric uses, and 1 use dependent on text.

### NON-ANAPHORIC

1. 'Such' combines with 'that' to form a compound subordinating conjunction introducing a clause. It is always non-anaphoric in the syntax:

'such' + 'that'

(1) The results were presented in a manner such that those unfamiliar with the topic still had no difficulty understanding them.

2. 'Such' combines with 'as' to serve as an explicit indicator that an appositional phrase follows. The appositional phrase provides one or more examples of the noun phrase that precedes it.

(2) Skills such as providing sympathy, explanation and advice are given.

in which case the syntax would be:

noun + 'such' + 'as'

A possible alternative syntax would be:

'such' + noun + 'as'

(3) The basketball teams in contention for first place are such teams as Georgetown, Syracuse and Boston College.

### ANAPHORIC

1. 'Such' functions anaphorically as a determiner in a noun phrase and may occur in either:

'such' + noun

(4) Tests were administered to students with I . Q.'s bordering on slow learner. Such students frequently presented a problem in placement.

or

'such' + adjective + noun

(5) At one time or another, most students take either SAT or GRE tests. Such standard tests are feared by most students.

This use is distinguishable from the second appositional use of 'such' in that 'as' does not follow the noun.

2. 'Such' functions pronominally in the syntax:

'as' + 'such'

(6) The Statue of Liberty is considered by many immigrants to be the symbol of freedom. As such, it was mandatory that the disintegrating structure be restored.

DEPENDENT ON TEXT

'Such' may serve as a predeterminer for an indefinite noun phrase in the syntax:

'such' + 'a'/'an' + noun

(7) System analysts recommended a completely new approach to scheduling deliveries. Such an approach would require extensive groundwork prior to implementation.

Whether the term 'such' is functioning anaphorically or not depends on whether the noun in the phrase has been specified in any greater detail earlier in text.

'Subject'

There are four abbreviated forms of reference to 'Subject' or 'Subjects' in abstracts, namely 'S', 'S's', 'Ss', or 'Ss''. These four possible realization forms were analyzed as a single group, with the following summary results. Abbreviated subject reference occurred in the 300 abstracts from the PsychAbs Database, a total of 213 times with 188 of these occurences being anaphoric for an F. I. of .88. There were no occurrences of any of these 4 abbreviations in the 300 abstracts from INSPEC.

Of the 25 non-anaphoric uses of the Subject abbreviations, 17 are identifiable by matching against 3 possible contextual patterns. The remaining 8 occurrences are much more difficult to tag as non-anaphoric because their syntactic environments are ones in which the same term may be used anaphorically. As a result, it will be necessary to first identify all consistent anaphoric and non-anaphoric patterns of use and then turn to semantic analysis to decide the status of a term occurring in a pattern which can be either anaphoric or non-anaphoric.

The suggested order of pattern-matching will be an interleaving of anaphoric and non-anaphoric rules, rather than first applying all rules of one usage in a sequence followed by all rules of the other usage. The most definite, easily matched patterns will be applied first, with those requiring more complex semantic processing being applied last.

1. Possessive - whenever the two possessive forms are observed, they are anaphoric.

   S's/Ss' + noun

   (1a) 112 college students studied different sets of 16 faces on 3 occasions. Analysis of Ss' consistency showed that more than 50% of them performed consistently.

   (1b) 112 college students studied different sets of 16 faces on 3 occasions. Analysis of 112 college students' consistency showed that more than 50% of them performed consistently.

2. Indefinite quantifier - when terms of this class (e. g. 'each', 'all', 'fewer', 'some', etc.) premodify S/Ss, the S-form was always anaphoric:

   indefinite quantifier + S/Ss

   (2a) Investigated influence of 48 hours of sleep deprivation (SD) in 12 19-30 year old males. Following SD, all Ss showed marked reductions of DNA synthesis.

   (2b) Investigated influence of 48 hours of sleep deprivation (SD) in 12 19-30 year old males. Following SD, all 12

19-30 year old males showed marked reductions of DNA synthesis.

3. Initial introduction of subjects under study is always non-anaphoric and usually of the form:

# + (age) + (adjective) + S/Ss

with either age or descriptive adjective optional, but at least one must be present.

(3a) 8 10 year old female Ss

or

(3b) 8 female Ss

or

(3c) 8 10 year old Ss

4. Another possible pattern for introducing subjects, which again is non-anaphoric, is:

S/Ss + 'were' + description

(4) Ss were nursing home residents with at least 1 year's residency.

5. A further non-anaphoric initial introductory pattern is:

S/Ss + description

(5) 6 Ss, aged 18 to 21, were administered the test.

6. When S/Ss is premodified by a definite article or determiner (e.g. 'the', 'these') the use is anaphoric.

determiner + S/Ss

(6a) Administered the Block Design subtest of the WISC to 550 members of 55 monozygotic twin kinships. Fingerprint ridge counts of the Ss were also analyzed.

(6b) Administered the Block Design subtest of the WISC to 550 members of 65 monozygotic twin kinships. Fingerprint ridge counts of the 550 members of 65 monozygotic kinships were also analyzed.

7. Having identified the above syntactic environments, it appears that the remaining occurrences of S/Ss in the following context will always indicate anaphoric use:

S/Ss + active verb

(7a) Experiment 1 compared recall following semantic orienting instructions, formal orienting instructions, and intentional learning instructions using 19 undergraduate novice chess players. Ss completed the Spatial Visualization Subtest.

(7b) Experiment 1 compared recall following semantic orienting instructions, formal orienting instructions, and intentional learning instructions using 19 undergraduate novice chess players. 19 undergraduate novice chess players completed the Spatial Visualization Subtest.

8. A fairly common syntax for 'S' to occur in, is:

adjective + S/Ss

which could be either anaphoric or non-anaphoric depending on whether the 'S' had been specified formerly. In the greater proportion of cases, the S-form is anaphoric, but it is possible for the S to be referring rather abstractly and generally to subjects without their having been specified earlier.

9. The remaining patterns of use for S/Ss are too singular to permit generalized rule-writing. Therefore, if an occurrence of S/Ss does not match any of the above syntactic patterns, simply check prior text to see if the term has been specified earlier.

# APPENDIX D

## Test Results of Rule Sets

## RESULTS OF TESTS OF RULE SETS

All rules were tested by at least three people. Tester 1 was involved in the project throughout the first year. Tester 2 was not involved except for rule tests. The third and subsequent testers were chosen haphazardly from among students in the School of Information Studies at Syracuse University. The only requirements were that they be native speakers of American English and had not previously tested any other rule sets.

In general, rules were tested by only three people. Whenever one of more did not achieve 90% accuracy, or nearly so, additional people were chosen to test the rules. Exceptions to this practice were when most of the problems arose from rules dealing with whether a concept had been specified earlier in greater detail, e.g. "each", or when the number of examples was so small that one error would drop percentages dramatically.

## RESULTS OF TESTS OF RULE SETS

| Potential Anaphor | Number Example Tested | Tester 1 | Tester 2 | Tester 3 | Tester 4 | Tester 5 | Overall | % Error Caused By 2 Rules* |
|---|---|---|---|---|---|---|---|---|
| all | 48 | .792 | .875 | .812 | | | .879 | 37.9 |
| another | 9 | .778 | .556 | .889 | | | .741 | 85.7 |
| any | 9 | 1.000 | 1.000 | .889 | | | .963 | 0.0 |
| both | 35 | 1.000 | .970 | 1.000 | | | .990 | 0.0 |
| do | 50 | 1.000 | .980 | .980 | | | .987 | 0.0 |
| each | 74 | .889 | .824 | .849 | .864 | | .857 | 92.8 |
| either | 21 | 1.000 | 1.000 | 1.000 | | | 1.000 | 0.0 |
| it | 58 | .966 | .966 | .966 | | | .966 | 0.0 |
| less | 35 | .914 | .857 | .909 | | | .893 | 27.3 |
| many | 26 | .846 | .769 | .731 | | | .782 | 82.4 |
| more | 51 | .843 | .857 | .765 | .608 | | .767 | 17.0 |
| most | 35 | .886 | .914 | .914 | | | .905 | 85.7 |
| much | 10 | .900 | .960 | .700 | .889 | | .846 | 0.0 |
| neither | 3 | 1.000 | .667 | 1.000 | | | .889 | 0.0 |
| no | 38 | .921 | .921 | .947 | | | .930 | 87.5 |
| none | 3 | 1.000 | 1.000 | 1.000 | | | 1.000 | 0.0 |
| one | 44 | .977 | .886 | .977 | .795 | .866 | .900 | 50.0 |
| ordinals | 33 | .848 | .848 | .939 | | | .879 | 58.3 |
| other | 44 | .864 | .907 | .837 | | | .869 | 76.5 |
| others | 16 | 1.000 | .812 | .875 | | | .896 | 0.0 |
| same | 38 | .921 | .842 | .789 | | | .851 | 82.4 |
| so | 11 | 1.000 | 1.000 | 1.000 | | | 1.000 | 0.0 |
| some | 35 | 1.000 | 1.000 | .971 | | | .981 | 0.0 |
| such | 61 | .869 | .918 | 1.000 | | | .929 | 38.5 |
| this, that, these, there | 42 | .881 | .810 | .833 | .857 | | .845 | 0.0 |
| which | 55 | .982 | .927 | .927 | .818 | 1.000 | .932 | 0.0 |

*The two rules causing consistent problems dealt with deciding whether a concept was specified in greater detail earlier in text.

# APPENDIX E

## Retrieval Tests Results

INSPEC Series 100
PsycABS Series 200

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### CENTRAL PRONOUNS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 101 | 1 | a | -0.424357 | -0.422512 | 0.999964 | -1.198307 | |
| 101 | 1 | d | -0.745425 | -0.753857 | 0.979255 | 0.320029 | |
| 101 | 1 | e | -0.338200 | -0.376721 | 0.938669 | 0.600638 | |
| 101 | 1 | h | -0.084690 | -0.080172 | 0.999317 | -0.625587 | |
| 101 | 1 | j | -0.605974 | -0.522589 | 0.950945 | -1.581806 | |
| 101 | 1 | m | -0.742554 | -0.731883 | 0.969913 | -0.330174 | |
| 101 | 1 | n | -0.692001 | -0.694001 | 0.969060 | 0.057258 | |
| 101 | 2 | a | -0.381796 | -0.379436 | 0.939941 | -1.188190 | |
| 101 | 2 | b | -0.328840 | -0.327643 | 0.999988 | -1.289193 | |
| 101 | 2 | c | -0.381283 | -0.379214 | 0.999955 | -1.185281 | |
| 101 | 2 | d | -0.701048 | -0.698247 | 0.976141 | -0.092007 | |
| 101 | 2 | e | -0.339941 | -0.375625 | 0.926487 | 0.508841 | |
| 101 | 2 | f | -0.662621 | -0.655125 | 0.973046 | -0.219739 | |
| 101 | 2 | g | -0.701503 | -0.698217 | 0.975441 | -0.106454 | |
| 101 | 2 | h | -0.031633 | -0.031112 | 0.999995 | -0.832977 | |
| 101 | 2 | j | -0.712239 | -0.697572 | 0.970971 | -0.438400 | |
| 101 | 2 | l | -0.001532 | -0.001532 | 1.000000 | 0.000000 | |
| 101 | 2 | m | -0.731639 | -0.722978 | 0.973538 | -0.281127 | |
| 101 | 2 | n | -0.741866 | -0.750436 | 0.976085 | 0.301526 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## CENTRAL PRONOUNS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 103 | 1 | a | 0.146284 | 0.144978 | 0.999953 | 0.665002 | |
| 103 | 1 | d | -0.053992 | -0.047788 | 0.980452 | -0.153916 | |
| 103 | 1 | e | -0.000528 | -0.000528 | 1.000000 | 0.000000 | |
| 103 | 1 | h | -0.319705 | -0.318253 | 0.999978 | -1.128444 | |
| 103 | 1 | j | -0.316556 | -0.309937 | 0.986634 | -0.208858 | |
| 103 | 1 | m | -0.333513 | -0.311583 | 0.979838 | -0.564470 | |
| 103 | 1 | n | -0.327129 | -0.299643 | 0.983126 | -0.769664 | |
| 103 | 2 | a | 0.257744 | 0.256450 | 0.999941 | 0.602435 | |
| 103 | 2 | b | 0.295230 | 0.294689 | 0.999988 | 0.563265 | |
| 103 | 2 | c | 0.256569 | 0.255414 | 0.999951 | 0.592566 | |
| 103 | 2 | d | -0.003726 | -0.016685 | 0.983559 | 0.350147 | |
| 103 | 2 | e | -0.000528 | -0.000528 | 1.000000 | 0.000000 | |
| 103 | 2 | f | 0.032856 | 0.011232 | 0.981155 | 0.545914 | |
| 103 | 2 | g | -0.008358 | -0.023820 | 0.982200 | 0.401651 | |
| 103 | 2 | h | -0.314465 | -0.313258 | 0.999984 | -1.079661 | |
| 103 | 2 | j | -0.350808 | -0.351904 | 0.985081 | 0.033215 | |
| 103 | 2 | l | -0.249678 | -0.248764 | 0.999989 | -0.988304 | |
| 103 | 2 | m | -0.213815 | -0.208176 | 0.980266 | -0.142283 | |
| 103 | 2 | n | -0.242461 | -0.234154 | 0.982868 | -0.226384 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: [illegible] Anaphoric Class

## CENTRAL PRONOUNS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 104 | 1 | a | -0.071262 | -0.071204 | 0.999[illegible] | -0.018778 | |
| 104 | 1 | d | -0.623340 | -0.654580 | 0.9776[illegible] | 0.833291 | |
| 104 | 1 | e | -0.429965 | -0.440598 | 0.990[illegible] | 0.389770 | |
| 104 | 1 | h | -0.347650 | -0.368305 | 0.996[illegible] | 1.180542 | |
| 104 | 1 | j | -0.470712 | -0.519349 | 0.985[illegible] | 1.430129 | |
| 104 | 1 | m | -0.602159 | -0.634720 | 0.98[illegible] | 0.951672 | |
| 104 | 1 | n | -0.415472 | -0.424679 | 0.987[illegible] | 0.288804 | |
| 104 | 2 | a | -0.153981 | -0.154278 | 0.999[illegible] | 0.080141 | |
| 104 | 2 | b | -0.161980 | -0.162270 | 0.999[illegible] | 0.165467 | |
| 104 | 2 | c | -0.149594 | -0.149793 | 0.999[illegible] | 0.059193 | |
| 104 | 2 | d | -0.592005 | -0.634221 | 0.970[illegible] | 0.960542 | |
| 104 | 2 | e | -0.426036 | -0.430578 | 0.988[illegible] | 0.150348 | |
| 104 | 2 | f | -0.577165 | -0.632414 | 0.966[illegible] | 1.156169 | |
| 104 | 2 | g | -0.595353 | -0.637609 | 0.966[illegible] | 0.936988 | |
| 104 | 2 | h | -0.178700 | -0.185040 | 0.999[illegible] | 1.439780 | |
| 104 | 2 | j | -0.472299 | -0.534012 | 0.983[illegible] | 1.663594 | |
| 104 | 2 | l | -0.017455 | -0.017947 | 0.999[illegible] | 1.327147 | |
| 104 | 2 | m | -0.565612 | -0.613311 | 0.976[illegible] | 1.173495 | |
| 104 | 2 | n | -0.384919 | -0.404667 | 0.986[illegible] | 0.628653 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 20[illegible] on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = [illegible]

TW: Term Weighting Schemes: See Result Page R-.

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If the Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### CENTRAL PRONOUNS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 107 | 1 | a | -0.269:70 | -0.269170 | 1.000000 | 0.000000 | |
| 107 | 1 | d | -0.361714 | -0.343713 | 0.991963 | -0.623202 | |
| 107 | 1 | e | -0.001095 | -0.001095 | 1.000000 | 0.000000 | |
| 107 | 1 | h | 0.152533 | 0.152646 | 0.999996 | -0.252577 | |
| 107 | 1 | j | -0.185056 | -0.197007 | 0.996773 | 0.624174 | |
| 107 | 1 | m | -0.327307 | -0.324536 | 0.993124 | -0.103046 | |
| 107 | 1 | n | -0.283932 | -0.289027 | 0.997671 | 0.321043 | |
| 107 | 2 | a | -0.290729 | -0.290729 | 1.000000 | 0.000000 | |
| 107 | 2 | b | -0.285307 | -0.285007 | 1.000000 | 0.000000 | |
| 107 | 2 | c | -0.292260 | -0.292260 | 1.000000 | 0.000000 | |
| 107 | 2 | d | -0.356617 | -0.342283 | 0.990676 | -0.461051 | |
| 107 | 2 | e | -0.001295 | -0.001095 | 1.000000 | 0.000000 | |
| 107 | 2 | f | -0.357481 | -0.343860 | 0.992538 | -0.489780 | |
| 107 | 2 | g | -0.356079 | -0.341662 | 0.990671 | -0.463463 | |
| 107 | 2 | h | 0.182394 | 0.181773 | 0.999988 | 0.530618 | |
| 107 | 2 | j | -0.089937 | -0.099660 | 0.998077 | 0.649207 | |
| 107 | 2 | l | 0.074758 | 0.074224 | 0.999998 | 1.003323 | |
| 107 | 2 | m | -0.315778 | -0.314926 | 0.993906 | -0.033509 | |
| 107 | 2 | n | -0.296:99 | -0.302537 | 0.997877 | 0.419752 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### CENTRAL PRONOUNS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 109 | 1 | a | -0.220519 | -0.220519 | 1.000000 | 0.000000 | |
| 109 | 1 | d | -0.360544 | -0.382547 | 0.986701 | 0.779711 | |
| 109 | 1 | e | -0.000545 | -0.000545 | 1.000000 | 0.000000 | |
| 109 | 1 | h | -0.066046 | -0.067359 | 0.999874 | 0.446446 | |
| 109 | 1 | j | -0.131462 | -0.124321 | 0.998326 | -0.669802 | |
| 109 | 1 | m | -0.328732 | -0.342388 | 0.990582 | 0.567932 | |
| 109 | 1 | n | -0.358384 | -0.353675 | 0.982359 | -0.144541 | |
| 109 | 2 | a | -0.228134 | -0.228134 | 1.000000 | 0.000000 | |
| 109 | 2 | b | -0.233510 | -0.233510 | 1.000000 | 0.000000 | |
| 109 | 2 | c | -0.234593 | -0.234593 | 1.000000 | 0.000000 | |
| 109 | 2 | d | -0.285177 | -0.315516 | 0.986674 | 1.044622 | |
| 109 | 2 | e | -0.000545 | -0.000545 | 1.000000 | 0.000000 | |
| 109 | 2 | f | -0.293837 | -0.316708 | 0.988327 | 0.844025 | |
| 109 | 2 | g | -0.289566 | -0.318656 | 0.986581 | 0.999663 | |
| 109 | 2 | h | -0.068850 | -0.069123 | 0.999960 | 0.165130 | |
| 109 | 2 | j | -0.125951 | -0.121443 | 0.999705 | -1.006178 | |
| 109 | 2 | l | -0.069214 | -0.069897 | 0.998987 | 0.081812 | |
| 109 | 2 | m | -0.296651 | -0.305507 | 0.955931 | 0.553573 | |
| 109 | 2 | n | -0.330370 | -0.317918 | 0.993681 | -0.629341 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## CENTRAL PRONOUNS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 135 | 1 | a | -0.590694 | -0.601249 | 0.999626 | 1.775102 | |
| 135 | 1 | d | -0.797236 | -0.774166 | 0.994983 | -1.372128 | |
| 135 | 1 | e | -0.001234 | -0.001234 | 1.000000 | 0.000000 | |
| 135 | 1 | h | -0.026503 | -0.047210 | 0.993752 | 0.764361 | |
| 135 | 1 | j | -0.633972 | -0.609244 | 0.970631 | -0.534471 | |
| 135 | 1 | m | -0.796876 | -0.774092 | 0.993503 | -1.222294 | |
| 135 | 1 | n | -0.842132 | -0.796913 | 0.985750 | -1.616689 | |
| 135 | 2 | a | -0.637630 | -0.648643 | 0.999289 | 1.447328 | |
| 135 | 2 | b | -0.647093 | -0.652499 | 0.999774 | 1.289818 | |
| 135 | 2 | c | -0.635240 | -0.644853 | 0.999490 | 1.461225 | |
| 135 | 2 | d | -0.818316 | -0.801744 | 0.997139 | -1.366167 | |
| 135 | 2 | e | -0.001234 | -0.001234 | 1.000000 | 0.000000 | |
| 135 | 2 | f | -0.818960 | -0.798506 | 0.996762 | -1.526437 | |
| 135 | 2 | g | -0.816188 | -0.797552 | 0.996860 | -1.436400 | |
| 135 | 2 | h | -0.001788 | -0.002167 | 0.999999 | 1.024805 | |
| 135 | 2 | j | -0.766710 | -0.759376 | 0.991229 | -0.352053 | |
| 135 | 2 | l | -0.001329 | -0.001392 | 1.000000 | 0.479305 | |
| 135 | 2 | m | -0.813643 | -0.800075 | 0.996594 | -1.072335 | |
| 135 | 2 | n | -0.826860 | -0.791625 | 0.991970 | -1.631944 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### CENTRAL PRONOUNS

|  |  |  | Correlation Coefficients |  |  | Significance Level |  |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 142 | 1 | a | -0.192139 | -0.192139 | 1.000000 | 0.000000 |  |
| 142 | 1 | d | -0.255597 | -0.235276 | 0.976352 | -0.420026 |  |
| 142 | 1 | e | -0.000662 | -0.000662 | 1.000000 | 0.000000 |  |
| 142 | 1 | h | -0.277455 | -0.211000 | 0.780692 | -0.452948 |  |
| 142 | 1 | i | -0.318605 | -0.302616 | 0.825734 | -0.124776 |  |
| 142 | 1 | m | -0.304107 | -0.250955 | 0.939528 | -0.693067 |  |
| 142 | 1 | n | -0.211922 | -0.153100 | 0.922218 | -0.661740 |  |
| 142 | 2 | a | -0.324310 | -0.324310 | 1.000000 | 0.000000 |  |
| 142 | 2 | b | -0.435620 | -0.435620 | 1.000000 | 0.000000 |  |
| 142 | 2 | c | -0.355980 | -0.355980 | 1.000000 | 0.000000 |  |
| 142 | 2 | c | -0.339456 | -0.379523 | 0.949774 | 0.589922 |  |
| 142 | 2 | e | -0.000662 | -0.000662 | 1.000000 | 0.000000 |  |
| 142 | 2 | f | -0.452453 | -0.493565 | 0.947337 | 0.625258 |  |
| 142 | 2 | g | -0.352275 | -0.394392 | 0.945752 | 0.600169 |  |
| 142 | 2 | h | -0.277419 | -0.028591 | 0.120297 | -0.848059 |  |
| 142 | 2 | i | -0.316247 | -0.386914 | 0.790580 | 0.511969 |  |
| 142 | 2 | . | -0.255325 | -0.001546 | 0.395578 | -1.038516 |  |
| 142 | 2 | m | -0.359307 | -0.384561 | 0.924844 | 0.306575 |  |
| 142 | 2 | n | -0.254817 | -0.264985 | 0.915232 | 0.111641 |  |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### CENTRAL PRONOUNS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 158 | 1 | a | 0.038318 | 0.037274 | 0.999861 | 0.234405 | |
| 158 | 1 | d | -0.162911 | -0.251475 | 0.976040 | 1.535352 | |
| 158 | 1 | e | -0.001032 | -0.001032 | 1.000000 | 0.000000 | |
| 158 | 1 | h | -0.261133 | -0.300780 | 0.994599 | 1.461146 | |
| 158 | 1 | j | -0.172847 | -0.286021 | 0.965154 | 1.631612 | |
| 158 | 1 | m | -0.212637 | -0.321438 | 0.971392 | 1.733685 | |
| 158 | 1 | n | -0.190370 | -0.307179 | 0.970019 | 1.812228 | |
| 158 | 2 | a | 0.090669 | 0.089328 | 0.999809 | 0.257478 | |
| 158 | 2 | b | 0.174475 | 0.173910 | 0.999972 | 0.285531 | |
| 158 | 2 | c | 0.116130 | 0.115103 | 0.999875 | 0.244216 | |
| 158 | 2 | d | -0.113967 | -0.182510 | 0.983876 | 1.439642 | |
| 158 | 2 | e | -0.001032 | -0.001032 | 1.000000 | 0.000000 | |
| 158 | 2 | f | 0.016314 | -0.045643 | 0.987622 | 1.475464 | |
| 158 | 2 | g | -0.089306 | -0.157537 | 0.983808 | 1.427362 | |
| 158 | 2 | h | -0.136551 | -0.211720 | 0.988490 | 1.864984 | |
| 158 | 2 | j | -0.103790 | -0.200107 | 0.981001 | 1.860726 | |
| 158 | 2 | l | -0.007262 | -0.042342 | 0.997273 | 1.778097 | |
| 158 | 2 | m | -0.131206 | -0.220264 | 0.981490 | 1.746647 | |
| 158 | 2 | n | -0.120778 | -0.217157 | 0.979994 | 1.816615 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

# A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## CENTRAL PRONOUNS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 170 | 1 | a | -0.716613 | -0.716651 | 0.999997 | 0.091870 | |
| 170 | 1 | d | -0.731051 | -0.711001 | 0.997701 | -1.642827 | |
| 170 | 1 | e | -0.001109 | -0.001109 | 1.000000 | 0.000000 | |
| 170 | 1 | h | 0.166612 | 0.162283 | 0.999947 | 1.852693 | |
| 170 | 1 | j | -0.594562 | -0.597756 | 0.995432 | 0.181383 | |
| 170 | 1 | m | -0.636259 | -0.627355 | 0.997374 | -0.681088 | |
| 170 | 1 | n | -0.515708 | -0.521729 | 0.995990 | 0.342059 | |
| 170 | 2 | a | -0.678385 | -0.678507 | 0.999995 | 0.231544 | |
| 170 | 2 | b | -0.637558 | -0.637593 | 0.999999 | 0.147925 | |
| 170 | 2 | c | -0.678090 | -0.678193 | 0.999996 | 0.212600 | |
| 170 | 2 | d | -0.691708 | -0.679235 | 0.998372 | -1.233185 | |
| 170 | 2 | e | -0.001109 | -0.001109 | 1.000000 | 0.000000 | |
| 170 | 2 | f | -0.696939 | -0.688013 | 0.997958 | -0.822354 | |
| 170 | 2 | g | -0.689511 | -0.677288 | 0.998387 | -1.213704 | |
| 170 | 2 | h | 0.153761 | 0.148824 | 0.999712 | 0.906317 | |
| 170 | 2 | j | -0.553947 | -0.568516 | 0.995968 | 0.839790 | |
| 170 | 2 | i | 0.045678 | 0.042885 | 0.999911 | 0.910987 | |
| 170 | 2 | m | -0.623943 | -0.621827 | 0.997625 | -0.171027 | |
| 170 | 2 | n | -0.533728 | -0.545733 | 0.995838 | 0.674425 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### CENTRAL PRONOUN

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 180 | 1 | a | -0.297536 | -0.298091 | 0.999850 | 0.167899 | |
| 180 | 1 | d | -0.475084 | -0.502717 | .995419 | 1.594363 | |
| 180 | 1 | e | -0.484654 | -0.481450 | 0.999093 | -0.428602 | |
| 180 | 1 | h | -0.234297 | -0.250466 | .998063 | 1.330695 | |
| 180 | 1 | j | -0.395090 | -0.414369 | 0.996511 | 1.243043 | |
| 180 | 1 | m | -0.473372 | -0.496783 | 0.995639 | 1.394231 | |
| 180 | 1 | n | -0.428501 | -0.440867 | 0.997166 | 0.903736 | |
| 180 | 2 | a | -0.219548 | -0.220523 | 0.999772 | 0.233906 | |
| 180 | 2 | b | -0.157462 | -0.157914 | 0.999949 | 0.227314 | |
| 180 | 2 | c | -0.213261 | -0.214164 | 0.999834 | 0.253606 | |
| 180 | 2 | d | -0.475058 | -0.499907 | .995165 | 1.406627 | |
| 180 | 2 | e | -0.434632 | -0.430285 | 0.998788 | -0.488342 | |
| 180 | 2 | f | -0.393963 | -0.424510 | 0.994469 | 1.553497 | |
| 180 | 2 | g | -0.468597 | -0.494745 | 0.994704 | 1.409973 | |
| 180 | 2 | h | -0.352302 | -0.377496 | 0.991005 | 1.001235 | |
| 180 | 2 | j | -0.449142 | -0.464609 | 0.998466 | 1.523503 | |
| 180 | 2 | l | -0.126480 | -0.139029 | 0.999041 | 1.442609 | |
| 180 | 2 | m | -0.476596 | -0.497468 | 0.997434 | 1.606254 | |
| 180 | 2 | n | -0.445123 | -0.454565 | 0.998221 | 0.878111 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$ If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### CENTRAL PRONOUNS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 182 | 1 | a | -0.194413 | -0.192936 | 0.999984 | -1.386175 | |
| 182 | 1 | d | -0.221779 | -0.227444 | 0.989033 | 0.207712 | |
| 182 | 1 | e | -0.000462 | -0.000462 | 1.000000 | 0.000000 | |
| 182 | 1 | h | 0.185728 | 0.141320 | 0.981922 | 1.250953 | |
| 182 | 1 | j | -0.008062 | -0.079609 | 0.940556 | 1.101022 | |
| 182 | 1 | m | -0.187365 | -0.224727 | 0.953986 | 0.666024 | |
| 182 | 1 | n | -0.166005 | -0.205681 | 0.935865 | 0.596899 | |
| 182 | 2 | a | -0.174304 | -0.172579 | 0.999979 | -1.414123 | |
| 182 | 2 | b | -0.101067 | -0.100631 | 0.999999 | -1.424118 | |
| 182 | 2 | c | -0.137425 | -0.136297 | 0.999991 | -1.417226 | |
| 182 | 2 | d | -0.223362 | -0.231375 | 0.990351 | 0.313412 | |
| 182 | 2 | e | -0.037327 | -0.037327 | 1.000000 | 0.000000 | |
| 182 | 2 | f | -0.147249 | -0.148305 | 0.991905 | 0.044418 | |
| 182 | 2 | g | -0.195747 | -0.202798 | 0.991447 | 0.291070 | |
| 182 | 2 | h | 0.188673 | 0.132517 | 0.974148 | 1.322604 | |
| 182 | 2 | j | -0.009834 | -0.077027 | 0.923563 | 0.911687 | |
| 182 | 2 | l | 0.157129 | 0.110227 | 0.979798 | 1.245173 | |
| 182 | 2 | m | -0.198272 | -0.220088 | 0.961063 | 0.423132 | |
| 182 | 2 | n | -0.190478 | -0.212590 | 0.937103 | 0.337021 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine, #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### CENTRAL PRONOUNS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 184 | 1 | a | -0.132394 | -0.132084 | 0.999998 | -0.626922 | |
| 184 | 1 | d | 0.129099 | 0.122673 | 0.991895 | 0.227508 | |
| 184 | 1 | e | 0.064221 | 0.082308 | 0.987397 | -0.510860 | |
| 184 | 1 | h | -0.045491 | -0.046270 | 0.999945 | 0.333364 | |
| 184 | 1 | j | 0.003093 | 0.003235 | 0.997638 | -0.009207 | |
| 184 | 1 | m | 0.080914 | 0.083962 | 0.994253 | -0.127560 | |
| 184 | 1 | n | -0.007330 | 0.006432 | 0.996203 | -0.706219 | |
| 184 | 2 | a | -0.148937 | -0.148704 | 0.999998 | -0.604388 | |
| 184 | 2 | b | -0.139155 | -0.139063 | 1.000000 | -0.641365 | |
| 184 | 2 | c | -0.145872 | -0.145648 | 0.999999 | -0.613183 | |
| 184 | 2 | d | 0.128770 | 0.131270 | 0.997377 | -0.155701 | |
| 184 | 2 | e | 0.142193 | 0.174389 | 0.985549 | -0.856993 | |
| 184 | 2 | f | 0.039625 | 0.039512 | 0.998732 | 0.010048 | |
| 184 | 2 | g | 0.121064 | 0.123144 | 0.997688 | -0.137803 | |
| 184 | 2 | h | -0.032087 | -0.034502 | 0.999285 | 0.285808 | |
| 184 | 2 | j | 0.038815 | 0.045164 | 0.998193 | -0.472689 | |
| 184 | 2 | l | -0.004347 | -0.004693 | 0.999980 | 0.244317 | |
| 184 | 2 | m | 0.076227 | 0.083662 | 0.997895 | -0.514018 | |
| 184 | 2 | n | -0.024803 | -0.011222 | 0.997728 | -0.901239 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## NOMINAL DEMONSTRATIVES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 101 | 1 | a | -0.424357 | -0.422512 | 0.999964 | -1.198307 | |
| 101 | 1 | d | -0.745425 | -0.743167 | 0.991340 | -0.131274 | |
| 101 | 1 | e | -0.338200 | -0.420836 | 0.919309 | 1.128781 | |
| 101 | 1 | h | -0.084690 | -0.073091 | 0.999172 | -1.456540 | |
| 101 | 1 | j | -0.605974 | -0.549778 | 0.974467 | -1.492881 | |
| 101 | 1 | m | -0.742554 | -0.733313 | 0.987130 | -0.434329 | |
| 101 | 1 | n | -0.692001 | -0.690408 | 0.979511 | -0.055786 | |
| 101 | 2 | a | -0.381796 | -0.379436 | 0.999941 | -1.188190 | |
| 101 | 2 | b | -0.328840 | -0.327643 | 0.999988 | -1.289199 | |
| 101 | 2 | c | -0.381283 | -0.379214 | 0.999955 | -1.185281 | |
| 101 | 2 | d | -0.701048 | -0.696190 | 0.970633 | -0.143759 | |
| 101 | 2 | e | -0.339941 | -0.424059 | 0.937578 | 1.302068 | |
| 101 | 2 | f | -0.662621 | -0.639035 | 0.958457 | -0.549887 | |
| 101 | 2 | g | -0.701503 | -0.693389 | 0.967768 | -0.228818 | |
| 101 | 2 | h | -0.031633 | -0.031112 | 0.999696 | -0.107922 | |
| 101 | 2 | j | -0.712239 | -0.694885 | 0.968140 | -0.493827 | |
| 101 | 2 | l | -0.001532 | -0.001634 | 1.000000 | 0.527291 | |
| 101 | 2 | m | -0.731639 | -0.721823 | 0.968284 | -0.231164 | |
| 101 | 2 | n | -0.741866 | -0.741629 | 0.972862 | -0.007803 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## NOMINAL DEMONSTRATIVES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 103 | 1 | a | 0.146284 | 0.144978 | 0.999953 | 0.665002 | |
| 103 | 1 | d | -0.053992 | -0.045412 | 0.968317 | -0.167196 | |
| 103 | 1 | e | -0.000528 | -0.000528 | 1.000000 | 0.000000 | |
| 103 | 1 | h | -0.319705 | -0.327984 | 0.936000 | 0.478664 | |
| 103 | 1 | j | -0.316556 | -0.347186 | 0.966486 | 0.613698 | |
| 103 | 1 | m | -0.333513 | -0.291407 | 0.960713 | -0.773208 | |
| 103 | 1 | n | -0.327129 | -0.299074 | 0.972824 | -0.619945 | |
| 103 | 2 | a | 0.257744 | 0.256450 | 0.999941 | 0.602435 | |
| 103 | 2 | b | 0.295230 | 0.294689 | 0.999988 | 0.563265 | |
| 103 | 2 | c | 0.256569 | 0.255414 | 0.999951 | 0.592566 | |
| 103 | 2 | d | -0.003726 | -0.000189 | 0.969297 | -0.069928 | |
| 103 | 2 | e | -0.000528 | -0.000528 | 1.000000 | 0.000000 | |
| 103 | 2 | f | 0.032856 | 0.031633 | 0.967820 | 0.023628 | |
| 103 | 2 | g | -0.008358 | -0.002717 | 0.967267 | -0.108007 | |
| 103 | 2 | h | -0.314465 | -0.322391 | 0.998423 | 0.726812 | |
| 103 | 2 | j | -0.350808 | -0.355834 | 0.970815 | 0.109041 | |
| 103 | 2 | l | -0.249678 | -0.247393 | 0.999388 | -0.330210 | |
| 103 | 2 | m | -0.213815 | -0.180145 | 0.962082 | -0.610850 | |
| 103 | 2 | n | -0.242461 | -0.214744 | 0.972087 | -0.590057 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

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Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## NOMINAL DEMONSTRATIVES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 104 | 1 | a | -0.071262 | -0.071204 | 0.999904 | -0.018778 | |
| 104 | 1 | d | -0.623340 | -0.696523 | 0.961874 | 1.476849 | |
| 104 | 1 | e | -0.429965 | -0.442825 | 0.994226 | 0.592072 | |
| 104 | 1 | h | -0.347650 | -0.325655 | 0.993938 | -0.941912 | |
| 104 | 1 | j | -0.470712 | -0.547544 | 0.969694 | 1.552337 | |
| 104 | 1 | m | -0.602159 | -0.665474 | 0.966753 | 1.350265 | |
| 104 | 1 | n | -0.415472 | -0.439667 | 0.973957 | 0.523398 | |
| 104 | 2 | a | -0.153981 | -0.154278 | 0.999859 | 0.080141 | |
| 104 | 2 | b | -0.161980 | -0.162270 | 0.999969 | 0.165467 | |
| 104 | 2 | c | -0.149594 | -0.149793 | 0.999884 | 0.059193 | |
| 104 | 2 | d | -0.592005 | -0.601739 | 0.960396 | 0.193667 | |
| 104 | 2 | e | -0.426036 | -0.444296 | 0.990461 | 0.653143 | |
| 104 | 2 | f | -0.577165 | -0.553011 | 0.943020 | -0.389168 | |
| 104 | 2 | g | -0.595353 | -0.594504 | 0.955413 | -0.015916 | |
| 104 | 2 | h | -0.178700 | -0.206653 | 0.990873 | 0.940980 | |
| 104 | 2 | j | -0.472299 | -0.515531 | 0.971369 | 0.917733 | |
| 104 | 2 | l | -0.017455 | -0.022193 | 0.999858 | 1.256017 | |
| 104 | 2 | m | -0.565612 | -0.585049 | 0.966321 | 0.409573 | |
| 104 | 2 | n | -0.384919 | -0.407576 | 0.981547 | 0.572858 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

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Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## NOMINAL DEMONSTRATIVES

|  |  |  | Correlation Coefficients |  |  | Significance Level |  |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 107 | 1 | a | -0.269170 | -0.269170 | 1.000000 | 0.000000 |  |
| 107 | 1 | d | -0.361714 | -0.364412 | 0.995629 | 0.127671 |  |
| 107 | 1 | e | -0.001095 | -0.001095 | 1.000000 | 0.000000 |  |
| 107 | 1 | h | 0.152533 | 0.150710 | 0.999975 | 1.080306 |  |
| 107 | 1 | j | -0.185056 | -0.202360 | 0.998655 | 1.393102 |  |
| 107 | 1 | m | -0.327307 | -0.340325 | 0.997626 | 0.820948 |  |
| 107 | 1 | n | -0.283932 | -0.311586 | 0.996012 | 1.319608 |  |
| 107 | 2 | a | -0.290729 | -0.290729 | 1.000000 | 0.000000 |  |
| 107 | 2 | b | -0.285007 | -0.285007 | 1.000000 | 0.000000 |  |
| 107 | 2 | c | -0.292260 | -0.292260 | 1.000000 | 0.000000 |  |
| 107 | 2 | d | -0.356617 | -0.356343 | 0.996669 | 0.525359 |  |
| 107 | 2 | e | -0.001095 | -0.001095 | 1.000000 | 0.000000 |  |
| 107 | 2 | f | -0.357481 | -0.366301 | 0.995186 | 0.396901 |  |
| 107 | 2 | g | -0.356079 | -0.366054 | 0.996413 | 0.519198 |  |
| 107 | 2 | h | 0.182394 | 0.179168 | 0.999933 | 1.161495 |  |
| 107 | 2 | j | -0.089937 | -0.113065 | 0.997489 | 1.350585 |  |
| 107 | 2 | i | 0.074758 | 0.072582 | 0.999973 | 1.221262 |  |
| 107 | 2 | m | -0.315778 | -0.329978 | 0.997207 | 0.822671 |  |
| 107 | 2 | n | -0.296199 | -0.317888 | 0.995274 | 1.078252 |  |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## NOMINAL DEMONSTRATIVES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 109 | 1 | a | -0.220519 | -0.220391 | 0.999993 | -0.184291 | |
| 109 | 1 | d | -0.360544 | -0.326320 | 0.990670 | -1.419951 | |
| 109 | 1 | e | -0.000545 | -0.000545 | 1.000000 | 0.000000 | |
| 109 | 1 | h | -0.066046 | -0.064229 | 0.999978 | -1.471942 | |
| 109 | 1 | j | -0.131462 | -0.107257 | 0.998547 | -2.425419 | (**** |
| 109 | 1 | m | -0.328732 | -0.284495 | 0.990214 | -1.763621 | |
| 109 | 1 | n | -0.358384 | -0.310506 | 0.983461 | -1.487103 | |
| 109 | 2 | a | -0.228134 | -0.227988 | 0.999989 | -0.169656 | |
| 109 | 2 | b | -0.233510 | -0.233440 | 0.999998 | -0.187991 | |
| 109 | 2 | c | -0.234593 | -0.234471 | 0.999992 | -0.165720 | |
| 109 | 2 | d | -0.285177 | -0.245864 | 0.978083 | -1.045704 | |
| 109 | 2 | e | -0.000545 | -0.000545 | 1.000000 | 0.000000 | |
| 109 | 2 | f | -0.293837 | -0.251748 | 0.977819 | -1.114459 | |
| 109 | 2 | g | -0.289566 | -0.248342 | 0.977525 | -1.083568 | |
| 109 | 2 | n | -0.068850 | -0.066723 | 0.999987 | -2.218802 | (**** |
| 109 | 2 | j | -0.125951 | -0.109958 | 0.998929 | -1.869873 | |
| 109 | 2 | l | -0.069214 | -0.067864 | 0.998908 | -0.155961 | |
| 109 | 2 | m | -0.296651 | -0.242497 | 0.977300 | -1.412894 | |
| 109 | 2 | n | -0.330370 | -0.263466 | 0.971533 | -1.567337 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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# A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## NOMINAL DEMONSTRATIVES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 135 | 1 | a | -0.590694 | -0.600304 | 0.999613 | 1.704237 | |
| 135 | 1 | d | -0.797236 | -0.811397 | 0.996153 | 1.049544 | |
| 135 | 1 | e | -0.001234 | -0.001234 | 1.000000 | 0.000000 | |
| 135 | 1 | h | -0.026503 | -0.038609 | 0.988267 | 0.326041 | |
| 135 | 1 | j | -0.633972 | -0.651346 | 0.971378 | 0.390669 | |
| 135 | 1 | m | -0.796876 | -0.812029 | 0.995231 | 1.014222 | |
| 135 | 1 | n | -0.842132 | -0.816545 | 0.986291 | -1.067418 | |
| 135 | 2 | a | -0.637630 | -0.648359 | 0.999258 | 1.390371 | |
| 135 | 2 | b | -0.647093 | -0.652380 | 0.999766 | 1.247222 | |
| 135 | 2 | c | -0.635240 | -0.644584 | 0.999466 | 1.418114 | |
| 135 | 2 | d | -0.818316 | -0.826965 | 0.997382 | 0.831461 | |
| 135 | 2 | e | -0.001234 | -0.001234 | 1.000000 | 0.000000 | |
| 135 | 2 | f | -0.818960 | -0.827055 | 0.994218 | 0.538514 | |
| 135 | 2 | g | -0.816188 | -0.825651 | 0.996668 | 0.805419 | |
| 135 | 2 | h | -0.001788 | -0.002294 | 0.999996 | 0.755600 | |
| 135 | 2 | j | -0.766710 | -0.782876 | 0.990348 | 0.739402 | |
| 135 | 2 | l | -0.001329 | -0.001408 | 1.000000 | 0.465540 | |
| 135 | 2 | m | -0.813643 | -0.823161 | 0.996399 | 0.776941 | |
| 135 | 2 | n | -0.826860 | -0.799486 | 0.988903 | -1.195659 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## NOMINAL DEMONSTRATIVES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 142 | 1 | a | -0.192139 | -0.189532 | 0.999963 | -1.337336 | |
| 142 | 1 | d | -0.255597 | -0.309716 | 0.982386 | 1.298286 | |
| 142 | 1 | e | -0.000662 | -0.000662 | 1.000000 | 0.000000 | |
| 142 | 1 | h | -0.277455 | -0.243869 | 0.895964 | -0.333009 | |
| 142 | 1 | j | -0.318605 | -0.343277 | 0.877584 | 0.231147 | |
| 142 | 1 | m | -0.304107 | -0.308791 | 0.956178 | 0.072539 | |
| 142 | 1 | n | -0.211922 | -0.211875 | 0.977826 | -0.001009 | |
| 142 | 2 | a | -0.324310 | -0.321402 | 0.999945 | -1.265263 | |
| 142 | 2 | b | -0.435620 | -0.434607 | 0.999992 | -1.209647 | |
| 142 | 2 | c | -0.355980 | -0.353568 | 0.999961 | -1.251661 | |
| 142 | 2 | d | -0.339456 | -0.400899 | 0.965546 | 1.087382 | |
| 142 | 2 | e | -0.000662 | -0.000662 | 1.000000 | 0.000000 | |
| 142 | 2 | f | -0.452453 | -0.497603 | 0.958492 | 0.771049 | |
| 142 | 2 | g | -0.352275 | -0.412972 | 0.962126 | 1.030924 | |
| 142 | 2 | h | -0.277419 | -0.076194 | 0.295975 | -0.764884 | |
| 142 | 2 | j | -0.316247 | -0.376493 | 0.927635 | 0.734979 | |
| 142 | 2 | l | -0.255325 | -0.002870 | 0.400343 | -1.037058 | |
| 142 | 2 | m | -0.359307 | -0.378244 | 0.990437 | 0.639633 | |
| 142 | 2 | n | -0.254817 | -0.273608 | 0.995289 | 0.871430 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## NOMINAL DEMONSTRATIVES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 158 | 1 | a | 0.038318 | 0.037274 | 0.999861 | 0.234405 | |
| 158 | 1 | d | -0.162911 | -0.189500 | 0.991659 | 0.781175 | |
| 158 | 1 | e | -0.001032 | -0.001032 | 1.000000 | 0.000000 | |
| 158 | 1 | h | -0.261133 | -0.266503 | 0.999645 | 0.778598 | |
| 158 | 1 | j | -0.172847 | -0.211844 | 0.982066 | 0.783766 | |
| 158 | 1 | m | -0.212637 | -0.236190 | 0.991949 | 0.710944 | |
| 158 | 1 | n | -0.190370 | -0.196723 | 0.988442 | 0.159367 | |
| 158 | 2 | a | 0.090669 | 0.089328 | 0.999809 | 0.257478 | |
| 158 | 2 | b | 0.174475 | 0.173910 | 0.999972 | 0.285531 | |
| 158 | 2 | c | 0.116130 | 0.115103 | 0.999875 | 0.244216 | |
| 158 | 2 | d | -0.113967 | -0.173253 | 0.986406 | 1.355710 | |
| 158 | 2 | e | -0.001032 | -0.001032 | 1.000000 | 0.000000 | |
| 158 | 2 | f | 0.016314 | -0.073108 | 0.977403 | 1.578636 | |
| 158 | 2 | g | -0.089306 | -0.158132 | 0.983367 | 1.420683 | |
| 158 | 2 | h | -0.136551 | -0.153608 | 0.997716 | 0.952612 | |
| 158 | 2 | j | -0.103790 | -0.140384 | 0.994449 | 1.306359 | |
| 158 | 2 | l | -0.007262 | -0.013926 | 0.999693 | 1.006950 | |
| 158 | 2 | m | -0.131206 | -0.181133 | 0.990884 | 1.394890 | |
| 158 | 2 | n | -0.120778 | -0.138402 | 0.994413 | 0.628804 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

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Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### NOMINAL DEMONSTRATIVES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 170 | 1 | a | -0.716613 | -0.685706 | 0.992263 | -1.401858 | |
| 170 | 1 | d | -0.731051 | -0.646183 | 0.983124 | -2.223138 | (**** |
| 170 | 1 | e | -0.001109 | -0.001109 | 1.000000 | 0.000000 | |
| 170 | 1 | h | 0.166612 | 0.173152 | 0.999647 | -1.085005 | |
| 170 | 1 | j | -0.594562 | -0.423001 | 0.950077 | -2.435965 | (**** |
| 170 | 1 | m | -0.636259 | -0.508180 | 0.968596 | -2.331625 | (**** |
| 170 | 1 | n | -0.515708 | -0.367760 | 0.960695 | -2.360772 | (**** |
| 170 | 2 | a | -0.678385 | -0.657053 | 0.994734 | -1.159620 | |
| 170 | 2 | b | -0.637558 | -0.621966 | 0.996295 | -0.985777 | |
| 170 | 2 | c | -0.678090 | -0.656719 | 0.994744 | -1.162284 | |
| 170 | 2 | d | -0.691708 | -0.616322 | 0.990087 | -2.414649 | (**** |
| 170 | 2 | e | -0.001109 | -0.001109 | 1.000000 | 0.000000 | |
| 170 | 2 | f | -0.696939 | -0.603192 | 0.984067 | -2.389533 | (**** |
| 170 | 2 | g | -0.689511 | -0.609665 | 0.989588 | -2.462709 | (**** |
| 170 | 2 | h | 0.153761 | 0.168288 | 0.984573 | -0.365236 | |
| 170 | 2 | j | -0.553947 | -0.397350 | 0.967510 | -2.664149 | (**** |
| 170 | 2 | l | 0.045678 | 0.080569 | 0.978677 | -0.738145 | |
| 170 | 2 | m | -0.623943 | -0.508156 | 0.978974 | -2.494178 | (**** |
| 170 | 2 | n | -0.533728 | -0.396867 | 0.974306 | -2.624840 | (**** |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

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Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### NOMINAL DEMONSTRATIVES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 180 | 1 | a | −0.297536 | −0.299409 | 0.999723 | 0.416233 | |
| 180 | 1 | d | −0.475084 | −0.443615 | 0.984269 | −0.987770 | |
| 180 | 1 | e | −0.484654 | −0.481425 | 0.961570 | −0.066709 | |
| 180 | 1 | h | −0.234297 | −0.249766 | 0.998054 | 1.270601 | |
| 180 | 1 | j | −0.395090 | −0.381667 | 0.987670 | −0.463165 | |
| 180 | 1 | m | −0.473372 | −0.448727 | 0.984676 | −0.787945 | |
| 180 | 1 | n | −0.428501 | −0.413271 | 0.990886 | −0.619616 | |
| 180 | 2 | a | −0.219548 | −0.222590 | 0.999568 | 0.530523 | |
| 180 | 2 | b | −0.157462 | −0.159036 | 0.999904 | 0.573887 | |
| 180 | 2 | c | −0.213261 | −0.215989 | 0.999684 | 0.554789 | |
| 180 | 2 | d | −0.475058 | −0.417685 | 0.972066 | −1.331525 | |
| 180 | 2 | e | −0.434632 | −0.425915 | 0.944135 | −0.144878 | |
| 180 | 2 | f | −0.393963 | −0.318482 | 0.965940 | −1.525360 | |
| 180 | 2 | g | −0.468597 | −0.406472 | 0.969999 | −1.383768 | |
| 180 | 2 | h | −0.352302 | −0.376805 | 0.990987 | 0.973103 | |
| 180 | 2 | j | −0.449142 | −0.430976 | 0.990650 | −0.735529 | |
| 180 | 2 | 1 | −0.126480 | −0.138604 | 0.999041 | 1.394380 | |
| 180 | 2 | m | −0.476596 | −0.442289 | 0.983133 | −1.038756 | |
| 180 | 2 | n | −0.445123 | −0.427303 | 0.992705 | −0.813962 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

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Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## NOMINAL DEMONSTRATIVES

|  |  |  | Correlation Coefficients |  |  | Significance Level |  |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 182 | 1 | a | -0.194413 | -0.192258 | 0.999981 | -1.848643 |  |
| 182 | 1 | d | -0.221779 | -0.203140 | 0.977838 | --0.479331 |  |
| 182 | 1 | e | -0.000462 | -0.000462 | 1.000000 | 0.000000 |  |
| 182 | 1 | h | 0.185728 | 0.150622 | 0.970196 | 0.771710 |  |
| 182 | 1 | j | -0.008062 | 0.012438 | 0.893354 | -0.234918 |  |
| 182 | 1 | m | -0.187365 | -0.151624 | 0.932188 | -0.521376 |  |
| 182 | 1 | n | -0.166005 | -0.126694 | 0.920920 | -0.529116 |  |
| 182 | 2 | a | -0.174304 | -0.171877 | 0.999975 | -1.851786 |  |
| 182 | 2 | b | -0.101067 | -0.100460 | 0.999999 | -1.865656 |  |
| 182 | 2 | c | -0.137425 | -0.135802 | 0.999989 | -1.884402 |  |
| 182 | 2 | d | -0.223362 | -0.213458 | 0.985832 | -0.319006 |  |
| 182 | 2 | e | -0.037327 | -0.037327 | 1.000000 | 0.000000 |  |
| 182 | 2 | f | -0.147249 | -0.146636 | 0.992152 | -0.026167 |  |
| 182 | 2 | g | -0.195747 | -0.189982 | 0.988383 | -0.203983 |  |
| 182 | 2 | h | 0.188673 | 0.159003 | 0.964936 | 0.602036 |  |
| 182 | 2 | j | -0.009834 | 0.004380 | 0.917764 | -0.185477 |  |
| 182 | 2 | l | 0.157129 | 0.155419 | 0.947313 | 0.028239 |  |
| 182 | 2 | m | -0.198272 | -0.185293 | 0.962634 | -0.256040 |  |
| 182 | 2 | n | -0.190478 | -0.174692 | 0.954375 | -0.281339 |  |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## NOMINAL DEMONSTRATIVES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 184 | 1 | a | -0.132394 | -0.132581 | 0.999986 | 0.160857 | |
| 184 | 1 | d | 0.129099 | 0.045449 | 0.969904 | 1.532534 | |
| 184 | 1 | e | 0.064221 | -0.020261 | 0.958485 | 1.314819 | |
| 184 | 1 | h | -0.045491 | -0.045720 | 0.999955 | 0.108175 | |
| 184 | 1 | j | 0.003093 | -0.040827 | 0.982528 | 1.051650 | |
| 184 | 1 | m | 0.080914 | -0.008729 | 0.968523 | 1.603064 | |
| 184 | 1 | n | -0.007330 | -0.073038 | 0.984191 | 1.655927 | |
| 184 | 2 | a | -0.148937 | -0.149158 | 0.999987 | 0.195327 | |
| 184 | 2 | b | -0.139155 | -0.139231 | 0.999998 | 0.166794 | |
| 184 | 2 | c | -0.145872 | -0.146048 | 0.999990 | 0.173707 | |
| 184 | 2 | d | 0.128770 | 0.037447 | 0.945520 | 1.244465 | |
| 184 | 2 | e | 0.142193 | 0.014647 | 0.914287 | 1.389034 | |
| 184 | 2 | f | 0.039625 | -0.028108 | 0.949411 | 0.953915 | |
| 184 | 2 | g | 0.121064 | 0.030929 | 0.944114 | 1.212131 | |
| 184 | 2 | h | -0.032087 | -0.034327 | 0.999309 | 0.269516 | |
| 184 | 2 | j | 0.038815 | -0.031108 | 0.963138 | 1.153730 | |
| 184 | 2 | l | -0.004347 | -0.004624 | 0.999980 | 0.195383 | |
| 184 | 2 | m | 0.076227 | -0.011179 | 0.951593 | 1.260306 | |
| 184 | 2 | n | -0.024803 | -0.089227 | 0.978990 | 1.409272 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## RELATIVE PRONOUNS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 101 | 1 | a | -0.424357 | -0.422512 | 0.999964 | -1.198307 | |
| 101 | 1 | d | -0.745425 | -0.749064 | 0.983325 | 0.153600 | |
| 101 | 1 | e | -0.338200 | -0.317505 | 0.989662 | -0.774259 | |
| 101 | 1 | h | -0.084690 | -0.079397 | 0.999559 | -0.911198 | |
| 101 | 1 | j | -0.605974 | -0.560081 | 0.973645 | -1.222811 | |
| 101 | 1 | m | -0.742554 | -0.734479 | 0.979690 | -0.304004 | |
| 101 | 1 | n | -0.692001 | -0.693713 | 0.980652 | 0.061782 | |
| 101 | 2 | a | -0.381796 | -0.379436 | 0.999941 | -1.188190 | |
| 101 | 2 | b | -0.328840 | -0.327643 | 0.999988 | -1.289199 | |
| 101 | 2 | c | -0.381283 | -0.379214 | 0.999955 | -1.185281 | |
| 101 | 2 | d | -0.701048 | -0.696451 | 0.993459 | -0.286243 | |
| 101 | 2 | e | -0.339941 | -0.327153 | 0.994202 | -0.640832 | |
| 101 | 2 | f | -0.662621 | -0.667009 | 0.993487 | 0.262321 | |
| 101 | 2 | g | -0.701503 | -0.696718 | 0.993454 | -0.297964 | |
| 101 | 2 | h | -0.031633 | -0.031835 | 0.999998 | 0.505168 | |
| 101 | 2 | j | -0.712239 | -0.700850 | 0.992115 | -0.646878 | |
| 101 | 2 | l | -0.001532 | -0.001532 | 1.000000 | 0.000000 | |
| 101 | 2 | m | -0.731639 | -0.723385 | 0.993237 | -0.523996 | |
| 101 | 2 | n | -0.741866 | -0.741049 | 0.993715 | -0.055436 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### RELATIVE PRONOUNS

|  |  |  | Correlation Coefficients |  |  | Significance Level |  |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 103 | 1 | a | 0.146284 | 0.144978 | 0.999953 | 0.665002 |  |
| 103 | 1 | d | -0.053992 | -0.187604 | 0.944741 | 1.989412 | <**** |
| 103 | 1 | e | -0.000528 | -0.000528 | 1.000000 | 0.000090 |  |
| 103 | 1 | h | -0.319705 | -0.325822 | 0.994913 | 0.313763 |  |
| 103 | 1 | j | -0.316556 | -0.387584 | 0.981964 | 1.906665 |  |
| 103 | 1 | m | -0.333513 | -0.465447 | 0.949744 | 2.140543 | <**** |
| 103 | 1 | n | -0.327129 | -0.444652 | 0.958036 | 2.081287 | <**** |
| 103 | 2 | a | 0.257744 | 0.256450 | 0.999941 | 0.602435 |  |
| 103 | 2 | b | 0.295230 | 0.294689 | 0.999988 | 0.563265 |  |
| 103 | 2 | c | 0.256569 | 0.255414 | 0.999951 | 0.592566 |  |
| 103 | 2 | d | -0.003726 | -0.111776 | 0.962889 | 1.952819 |  |
| 103 | 2 | e | -0.000528 | -0.000528 | 1.000000 | 0.000000 |  |
| 103 | 2 | f | 0.032856 | -0.071671 | 0.969418 | 2.078721 | <**** |
| 103 | 2 | g | -0.008358 | -0.117750 | 0.963068 | 1.982336 | <**** |
| 103 | 2 | h | -0.314465 | -0.325404 | 0.990424 | 0.408408 |  |
| 103 | 2 | j | -0.350808 | -0.408677 | 0.977241 | 1.413670 |  |
| 103 | 2 | l | -0.249678 | -0.266875 | 0.993847 | 0.784268 |  |
| 103 | 2 | m | -0.213815 | -0.328665 | 0.959766 | 2.033012 | <**** |
| 103 | 2 | n | -0.242461 | -0.354892 | 0.963925 | 2.106945 | <**** |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### RELATIVE PRONOUNS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 104 | 1 | a | -0.071262 | -0.071204 | 0.999904 | -0.018778 | |
| 104 | 1 | d | -0.623340 | -0.627595 | 0.982378 | 0.130218 | |
| 104 | 1 | e | -0.429965 | -0.364141 | 0.968826 | -1.264247 | |
| 104 | 1 | h | -0.347650 | -0.356833 | 0.999429 | 1.278629 | |
| 104 | 1 | j | -0.470712 | -0.494600 | 0.997058 | 1.524916 | |
| 104 | 1 | m | -0.602159 | -0.610769 | 0.984256 | 0.272978 | |
| 104 | 1 | n | -0.415472 | -0.376727 | 0.980639 | -0.950236 | |
| 104 | 2 | a | -0.153981 | -0.154278 | 0.999859 | 0.080141 | |
| 104 | 2 | b | -0.161980 | -0.162270 | 0.999969 | 0.165467 | |
| 104 | 2 | c | -0.149594 | -0.149793 | 0.999884 | 0.059193 | |
| 104 | 2 | d | -0.592005 | -0.577360 | 0.981243 | -0.416033 | |
| 104 | 2 | e | -0.426036 | -0.347535 | 0.961916 | -1.356476 | |
| 104 | 2 | f | -0.577165 | -0.550421 | 0.980798 | -0.731410 | |
| 104 | 2 | g | -0.595353 | -0.578368 | 0.980448 | -0.472944 | |
| 104 | 2 | h | -0.178700 | -0.173816 | 0.999808 | -1.128083 | |
| 104 | 2 | j | -0.472293 | -0.464022 | 0.989392 | -0.287427 | |
| 104 | 2 | l | -0.017455 | -0.016772 | 0.999998 | -1.475195 | |
| 104 | 2 | m | -0.565612 | -0.548504 | 0.980712 | -0.467734 | |
| 104 | 2 | n | -0.384919 | -0.325057 | 0.978652 | -1.364343 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

# A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## RELATIVE PRONOUNS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 107 | 1 | a | -0.269170 | -0.269170 | 1.000000 | 0.000000 | |
| 107 | 1 | d | -0.361714 | -0.372445 | 0.986546 | 0.289865 | |
| 107 | 1 | e | -0.001095 | -0.001095 | 1.000000 | 0.000000 | |
| 107 | 1 | h | 0.152533 | 0.153752 | 0.999995 | -1.614661 | |
| 107 | 1 | j | -0.185056 | -0.168829 | 0.997112 | -0.892639 | |
| 107 | 1 | m | -0.327307 | -0.331444 | 0.992286 | 0.145449 | |
| 107 | 1 | n | -0.283932 | -0.273002 | 0.995338 | -0.485199 | |
| 107 | 2 | a | -0.290729 | -0.290729 | 1.000000 | 0.000000 | |
| 107 | 2 | b | -0.285007 | -0.285007 | 1.000000 | 0.000000 | |
| 107 | 2 | c | -0.292260 | -0.292260 | 1.000000 | 0.000000 | |
| 107 | 2 | d | -0.358617 | -0.360105 | 0.977705 | 0.072999 | |
| 107 | 2 | e | -0.001095 | -0.001095 | 1.000000 | 0.000000 | |
| 107 | 2 | f | -0.357481 | -0.349129 | 0.980249 | -0.185265 | |
| 107 | 2 | g | -0.356079 | -0.357375 | 0.977327 | 0.026876 | |
| 107 | 2 | h | 0.182394 | 0.182384 | 0.999985 | 0.008059 | |
| 107 | 2 | j | -0.089937 | -0.095323 | 0.997719 | 0.330179 | |
| 107 | 2 | l | 0.074758 | 0.074475 | 0.999997 | 0.514123 | |
| 107 | 2 | m | -0.315778 | -0.330489 | 0.985489 | 0.375926 | |
| 107 | 2 | n | -0.296199 | -0.310458 | 0.993636 | 0.545675 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

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Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### RELATIVE PRONOUNS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 109 | 1 | a | -0.220519 | -0.220519 | 1.000000 | 0.000000 | |
| 109 | 1 | d | -0.360544 | -0.368055 | 0.995997 | 0.484636 | |
| 109 | 1 | e | -0.000545 | -0.000545 | 1.000000 | 0.000000 | |
| 109 | 1 | h | -0.066046 | -0.067203 | 0.999885 | 0.412155 | |
| 109 | 1 | j | -0.131462 | -0.115287 | 0.998461 | -1.579334 | |
| 109 | 1 | m | -0.328732 | -0.313539 | 0.995504 | -0.907232 | |
| 109 | 1 | n | -0.358384 | -0.327633 | 0.992719 | -1.443222 | |
| 109 | 2 | a | -0.228134 | -0.228134 | 1.000000 | 0.000000 | |
| 109 | 2 | b | -0.233510 | -0.233510 | 1.000000 | 0.000000 | |
| 109 | 2 | c | -0.234593 | -0.234593 | 1.000000 | 0.000000 | |
| 109 | 2 | d | -0.285177 | -0.295662 | 0.996742 | 0.729392 | |
| 109 | 2 | e | -0.000545 | -0.000545 | 1.000000 | 0.000000 | |
| 109 | 2 | f | -0.293837 | -0.303509 | 0.997940 | 0.847540 | |
| 109 | 2 | g | -0.289566 | -0.299859 | 0.997042 | 0.752365 | |
| 109 | 2 | h | -0.068850 | -0.069299 | 0.999962 | 0.275075 | |
| 109 | 2 | j | -0.125951 | -0.117146 | 0.999679 | -1.881577 | |
| 109 | 2 | l | -0.069214 | -0.070093 | 0.998916 | 0.101836 | |
| 109 | 2 | m | -0.296651 | -0.287690 | 0.997368 | -0.694039 | |
| 109 | 2 | n | -0.330370 | -0.304761 | 0.995856 | -1.577314 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

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Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### RELATIVE PRONOUNS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 135 | 1 | a | -0.590694 | -0.600904 | 0.999613 | 1.704237 | |
| 135 | 1 | d | -0.797236 | -0.799843 | 0.995308 | 0.184390 | |
| 135 | 1 | e | -0.001234 | -0.001234 | 1.000000 | 0.000000 | |
| 135 | 1 | h | -0.026503 | -0.036135 | 0.998851 | 0.828982 | |
| 135 | 1 | j | -0.633972 | -0.637349 | 0.973348 | 0.078466 | |
| 135 | 1 | m | -0.796876 | -0.802317 | 0.994092 | 0.342309 | |
| 135 | 1 | n | -0.842132 | -0.818151 | 0.994338 | -1.444957 | |
| 135 | 2 | a | -0.637630 | -0.648359 | 0.999258 | 1.390371 | |
| 135 | 2 | b | -0.647093 | -0.652380 | 0.999766 | 1.247222 | |
| 135 | 2 | c | -0.635240 | -0.644584 | 0.999466 | 1.418114 | |
| 135 | 2 | d | -0.818316 | -0.814195 | 0.996665 | -0.357978 | |
| 135 | 2 | e | -0.001234 | -0.001234 | 1.000000 | 0.000000 | |
| 135 | 2 | f | -0.818960 | -0.810473 | 0.996826 | -0.734329 | |
| 135 | 2 | g | -0.816188 | -0.811116 | 0.996606 | -0.432548 | |
| 135 | 2 | h | -0.001788 | -0.002041 | 0.999999 | 0.916607 | |
| 135 | 2 | j | -0.766710 | -0.766538 | 0.988823 | -0.007431 | |
| 135 | 2 | l | -0.001329 | -0.001392 | 1.000000 | 0.479305 | |
| 135 | 2 | m | -0.813643 | -0.810744 | 0.995716 | -0.221203 | |
| 135 | 2 | n | -0.826860 | -0.794102 | 0.993203 | -1.645399 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

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Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## RELATIVE PRONOUNS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 142 | 1 | a | -0.192139 | -0.189532 | 0.999963 | -1.337336 | |
| 142 | 1 | d | -0.255597 | -0.222814 | 0.996263 | -1.681147 | |
| 142 | 1 | e | -0.000662 | -0.000662 | 1.000000 | 0.000000 | |
| 142 | 1 | h | -0.277455 | -0.209615 | 0.780640 | -0.462259 | |
| 142 | 1 | j | -0.318605 | -0.272716 | 0.815363 | -0.346104 | |
| 142 | 1 | m | -0.304107 | -0.208429 | 0.939471 | -1.235898 | |
| 142 | 1 | n | -0.211922 | -0.088551 | 0.928968 | -1.446407 | |
| 142 | 2 | a | -0.324310 | -0.321402 | 0.999945 | -1.265263 | |
| 142 | 2 | b | -0.435620 | -0.434607 | 0.999992 | -1.209647 | |
| 142 | 2 | c | -0.355980 | -0.353568 | 0.999961 | -1.251661 | |
| 142 | 2 | d | -0.339456 | -0.320403 | 0.993939 | -0.794982 | |
| 142 | 2 | e | -0.000662 | -0.000662 | 1.000000 | 0.000000 | |
| 142 | 2 | f | -0.452453 | -0.435825 | 0.994012 | -0.733332 | |
| 142 | 2 | g | -0.352275 | -0.331839 | 0.993523 | -0.827976 | |
| 142 | 2 | h | -0.277419 | -0.027038 | 0.120442 | -0.853484 | |
| 142 | 2 | j | -0.316247 | -0.317895 | 0.788080 | 0.011700 | |
| 142 | 2 | l | -0.255325 | -0.001435 | 0.395597 | -1.038994 | |
| 142 | 2 | m | -0.359307 | -0.298909 | 0.946984 | -0.853515 | |
| 142 | 2 | n | -0.254817 | -0.173665 | 0.935669 | -1.009203 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## RELATIVE PRONOUNS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 158 | 1 | a | 0.038318 | 0.037274 | 0.999861 | 0.234405 | |
| 158 | 1 | d | -0.162911 | -0.118249 | 0.963858 | -0.627849 | |
| 158 | 1 | e | -0.001032 | -0.001032 | 1.000000 | 0.000000 | |
| 158 | 1 | h | -0.261133 | -0.259392 | 0.991015 | -0.050337 | |
| 158 | 1 | j | -0.172847 | -0.128728 | 0.950448 | -0.530626 | |
| 158 | 1 | m | -0.212637 | -0.156002 | 0.948555 | -0.672173 | |
| 158 | 1 | n | -0.190370 | -0.140259 | 0.940936 | -0.553406 | |
| 158 | 2 | a | 0.090669 | 0.089328 | 0.999809 | 0.257478 | |
| 158 | 2 | b | 0.174475 | 0.173910 | 0.999972 | 0.285531 | |
| 158 | 2 | c | 0.116130 | 0.115103 | 0.999875 | 0.244216 | |
| 158 | 2 | d | -0.113967 | -0.080389 | 0.965574 | -0.481211 | |
| 158 | 2 | e | -0.001032 | -0.001032 | 1.000000 | 0.000000 | |
| 158 | 2 | f | 0.016314 | 0.039111 | 0.971860 | -0.359773 | |
| 158 | 2 | g | -0.089306 | -0.057415 | 0.964356 | -0.448257 | |
| 158 | 2 | h | -0.136551 | -0.155115 | 0.988556 | 0.463965 | |
| 158 | 2 | j | -0.103790 | -0.074783 | 0.960184 | -0.386262 | |
| 158 | 2 | l | -0.007262 | -0.012984 | 0.997264 | 0.289458 | |
| 158 | 2 | m | -0.131206 | -0.092580 | 0.953564 | -0.477538 | |
| 158 | 2 | n | -0.120778 | -0.083182 | 0.952300 | -0.458020 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### RELATIVE PRONOUNS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 170 | 1 | a | -0.716613 | -0.716201 | 0.999987 | -0.500158 | |
| 170 | 1 | d | -0.731051 | -0.710474 | 0.987554 | -0.801223 | |
| 170 | 1 | e | -0.001109 | -0.001109 | 1.000000 | 0.000000 | |
| 170 | 1 | h | 0.166612 | 0.162578 | 0.999901 | 1.260646 | |
| 170 | 1 | j | -0.594562 | -0.606288 | 0.958230 | 0.222149 | |
| 170 | 1 | m | -0.636259 | -0.628139 | 0.984468 | -0.259331 | |
| 170 | 1 | n | -0.515708 | -0.513102 | 0.977975 | -0.063236 | |
| 170 | 2 | a | -0.678385 | -0.678112 | 0.999979 | -0.249519 | |
| 170 | 2 | b | -0.637558 | -0.637414 | 0.999996 | -0.274505 | |
| 170 | 2 | c | -0.678090 | -0.677830 | 0.999983 | -0.262757 | |
| 170 | 2 | d | -0.691708 | -0.681200 | 0.994732 | -0.605948 | |
| 170 | 2 | e | -0.001109 | -0.001109 | 1.000000 | 0.000000 | |
| 170 | 2 | f | -0.696939 | -0.688632 | 0.996515 | -0.593786 | |
| 170 | 2 | g | -0.689511 | -0.678255 | 0.995194 | -0.675007 | |
| 170 | 2 | h | 0.153761 | 0.149720 | 0.999621 | 0.646697 | |
| 170 | 2 | j | -0.553947 | -0.561281 | 0.988401 | 0.252795 | |
| 170 | 2 | l | 0.045678 | 0.042893 | 0.999890 | 0.817551 | |
| 170 | 2 | m | -0.623943 | -0.618165 | 0.993232 | -0.275853 | |
| 170 | 2 | n | -0.533728 | -0.531134 | 0.990012 | -0.094582 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## RELATIVE PRONOUNS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 180 | 1 | a | -0.297536 | -0.299409 | 0.999723 | 0.416233 | |
| 180 | 1 | d | -0.475084 | -0.453109 | 0.993410 | -1.065212 | |
| 180 | 1 | e | -0.484654 | -0.486419 | 0.997938 | 0.157082 | |
| 180 | 1 | h | -0.234297 | -0.237410 | 0.999924 | 1.293968 | |
| 180 | 1 | j | -0.395090 | -0.371335 | 0.993344 | -1.103068 | |
| 180 | 1 | m | -0.473372 | -0.453674 | 0.995890 | -1.203442 | |
| 180 | 1 | n | -0.428501 | -0.418932 | 0.998212 | -0.876201 | |
| 180 | 2 | a | -0.219548 | -0.222590 | 0.999568 | 0.530523 | |
| 180 | 2 | b | -0.157462 | -0.159036 | 0.999904 | 0.573887 | |
| 180 | 2 | c | -0.213261 | -0.215989 | 0.999684 | 0.554789 | |
| 180 | 2 | d | -0.475058 | -0.445913 | 0.990742 | -1.185910 | |
| 180 | 2 | e | -0.434632 | -0.429700 | 0.989951 | -0.192910 | |
| 180 | 2 | f | -0.393963 | -0.367201 | 0.992613 | -1.176779 | |
| 180 | 2 | g | -0.468597 | -0.438665 | 0.990722 | -1.211435 | |
| 180 | 2 | h | -0.352302 | -0.363534 | 0.998512 | 1.092303 | |
| 180 | 2 | j | -0.449142 | -0.436498 | 0.996630 | -0.851719 | |
| 180 | 2 | l | -0.126480 | -0.131559 | 0.999839 | 1.424329 | |
| 180 | 2 | m | -0.476596 | -0.461856 | 0.996425 | -0.974963 | |
| 180 | 2 | n | -0.445123 | -0.440131 | 0.999104 | -0.654365 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### RELATIVE PRONOUNS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 182 | 1 | a | -0.194413 | -0.192936 | 0.999984 | -1.386175 | |
| 182 | 1 | d | -0.221779 | -0.219681 | 0.995821 | -0.124511 | |
| 182 | 1 | e | -0.000462 | -0.000462 | 1.000000 | 0.000000 | |
| 182 | 1 | h | 0.185728 | 0.183517 | 0.999973 | 1.602480 | |
| 182 | 1 | j | -0.008062 | -0.024828 | 0.993841 | 0.799560 | |
| 182 | 1 | m | -0.187365 | -0.203022 | 0.993923 | 0.714507 | |
| 182 | 1 | n | -0.166005 | -0.197479 | 0.991731 | 1.313595 | |
| 182 | 2 | a | -0.174304 | -0.172579 | 0.999979 | -1.414123 | |
| 182 | 2 | b | -0.101067 | -0.100631 | 0.999999 | -1.424118 | |
| 182 | 2 | c | -0.137425 | -0.136297 | 0.999991 | -1.417226 | |
| 182 | 2 | d | -0.223362 | -0.207288 | 0.997041 | -1.128704 | |
| 182 | 2 | e | -0.037327 | -0.037327 | 1.000000 | 0.000000 | |
| 182 | 2 | f | -0.147249 | -0.137067 | 0.998372 | -0.952933 | |
| 182 | 2 | g | -0.195747 | -0.181955 | 0.997421 | -1.032913 | |
| 182 | 2 | h | 0.188673 | 0.183247 | 0.999847 | 1.660796 | |
| 182 | 2 | j | -0.009834 | -0.033027 | 0.995221 | 1.255797 | |
| 182 | 2 | l | 0.157129 | 0.154619 | 0.999964 | 1.570127 | |
| 182 | 2 | m | -0.198272 | -0.201929 | 0.996056 | 0.222398 | |
| 182 | 2 | n | -0.190478 | -0.214016 | 0.994976 | 1.264654 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC; 200-209 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

# A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## RELATIVE PRONOUNS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 184 | 1 | a | -0.132394 | -0.132581 | 0.999986 | 0.160857 | |
| 184 | 1 | d | 0.129099 | 0.173147 | 0.988817 | -1.329493 | |
| 184 | 1 | e | 0.064221 | 0.081639 | 0.977926 | -0.371750 | |
| 184 | 1 | h | -0.045491 | -0.045826 | 0.999957 | 0.161818 | |
| 184 | 1 | j | 0.003093 | 0.009654 | 0.984701 | -0.167749 | |
| 184 | 1 | m | 0.080914 | 0.115369 | 0.991236 | -1.168877 | |
| 184 | 1 | n | -0.007330 | 0.008813 | 0.993241 | -0.620961 | |
| 184 | 2 | a | -0.148937 | -0.149158 | 0.999987 | 0.195327 | |
| 184 | 2 | b | -0.139155 | -0.139231 | 0.999998 | 0.166794 | |
| 184 | 2 | c | -0.145872 | -0.146048 | 0.999990 | 0.173707 | |
| 184 | 2 | d | 0.128770 | 0.159767 | 0.992321 | -1.128636 | |
| 184 | 2 | e | 0.142193 | 0.155850 | 0.988994 | -0.416260 | |
| 184 | 2 | f | 0.039625 | 0.066788 | 0.992792 | -1.013214 | |
| 184 | 2 | g | 0.121064 | 0.152444 | 0.992028 | -1.120426 | |
| 184 | 2 | h | -0.032087 | -0.034308 | 0.999341 | 0.273748 | |
| 184 | 2 | j | 0.038815 | 0.057438 | 0.998615 | -1.583726 | |
| 184 | 2 | l | -0.004347 | -0.004693 | 0.999980 | 0.244317 | |
| 184 | 2 | m | 0.076227 | 0.103527 | 0.996773 | -1.524129 | |
| 184 | 2 | n | -0.024803 | -0.015615 | 0.998805 | -0.840834 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine, #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## NOMINAL SUBSTITUTES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 101 | 1 | a | -0.424357 | -0.422512 | 0.999964 | -1.198307 | |
| 101 | 1 | d | -0.745425 | -0.749496 | 0.998202 | 0.516943 | |
| 101 | 1 | e | -0.338200 | -0.302868 | 0.984463 | -1.072558 | |
| 101 | 1 | h | -0.084390 | -0.079805 | 0.999592 | -0.874708 | |
| 101 | 1 | j | -0.605974 | -0.557030 | 0.986246 | -1.742009 | |
| 101 | 1 | m | -0.742554 | -0.742365 | 0.997346 | -0.019766 | |
| 101 | 1 | n | -0.692001 | -0.695962 | 0.996262 | 0.323711 | |
| 101 | 2 | a | -0.381796 | -0.379436 | 0.999941 | -1.188190 | |
| 101 | 2 | b | -0.328840 | -0.327643 | 0.999988 | -1.289199 | |
| 101 | 2 | c | -0.381283 | -0.379214 | 0.999955 | -1.185281 | |
| 101 | 2 | d | -0.701048 | -0.697187 | 0.998626 | -0.521328 | |
| 101 | 2 | e | -0.339941 | -0.317809 | 0.993168 | -1.016145 | |
| 101 | 2 | f | -0.662621 | -0.659921 | 0.998299 | -0.314047 | |
| 101 | 2 | g | -0.701503 | -0.697474 | 0.998507 | -0.522256 | |
| 101 | 2 | h | -0.031633 | -0.031691 | 0.999999 | 0.182624 | |
| 101 | 2 | j | -0.712239 | -0.702921 | 0.997943 | -1.016993 | |
| 101 | 2 | l | -0.001532 | -0.001532 | 1.000000 | 0.000000 | |
| 101 | 2 | m | -0.731639 | -0.726186 | 0.998407 | -0.708641 | |
| 101 | 2 | n | -0.741866 | -0.739675 | 0.998179 | -0.274987 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## NOMINAL SUBSTITUTES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 103 | 1 | a | 0.146284 | 0.144978 | 0.999953 | 0.665002 | |
| 103 | 1 | d | -0.053992 | -0.052729 | 0.999982 | -1.023534 | |
| 103 | 1 | e | -0.000528 | -0.000528 | 1.000000 | 0.000000 | |
| 103 | 1 | h | -0.319705 | -0.320317 | 0.999982 | 0.527357 | |
| 103 | 1 | j | -0.316556 | -0.326555 | 0.996549 | 0.621214 | |
| 103 | 1 | m | -0.333513 | -0.329265 | 0.999565 | -0.744875 | |
| 103 | 1 | n | -0.327129 | -0.322722 | 0.999634 | -0.839744 | |
| 103 | 2 | a | 0.257744 | 0.256450 | 0.999941 | 0.602435 | |
| 103 | 2 | b | 0.295230 | 0.294689 | 0.999988 | 0.563265 | |
| 103 | 2 | c | 0.256569 | 0.255414 | 0.999951 | 0.592566 | |
| 103 | 2 | d | -0.003726 | -0.004200 | 0.999985 | 0.421409 | |
| 103 | 2 | e | -0.000528 | -0.000528 | 1.000000 | 0.000000 | |
| 103 | 2 | f | 0.032856 | 0.032626 | 0.999996 | 0.423198 | |
| 103 | 2 | g | -0.008358 | -0.008768 | 0.999987 | 0.391681 | |
| 103 | 2 | h | -0.314465 | -0.315672 | 0.999963 | 0.718655 | |
| 103 | 2 | j | -0.350808 | -0.356665 | 0.998460 | 0.551479 | |
| 103 | 2 | l | -0.249678 | -0.249504 | 0.999992 | -0.220220 | |
| 103 | 2 | m | -0.213815 | -0.213963 | 0.999843 | 0.041967 | |
| 103 | 2 | n | -0.242461 | -0.243094 | 0.999793 | 0.157330 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### NOMINAL SUBSTITUTES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 104 | 1 | a | -0.071262 | -0.071204 | 0.999904 | -0.018778 | |
| 104 | 1 | d | -0.623340 | -0.619571 | 0.997626 | -0.311435 | |
| 104 | 1 | e | -0.429965 | -0.421939 | 0.998045 | -0.631066 | |
| 104 | 1 | h | -0.347650 | -0.337124 | 0.994212 | -0.464893 | |
| 104 | 1 | j | -0.470712 | -0.447830 | 0.993779 | -1.016407 | |
| 104 | 1 | m | -0.602159 | -0.595621 | 0.996503 | -0.434985 | |
| 104 | 1 | n | -0.415472 | -0.368309 | 0.986257 | -1.355409 | |
| 104 | 2 | a | -0.153981 | -0.154278 | 0.999859 | 0.080141 | |
| 104 | 2 | b | -0.161980 | -0.162270 | 0.999969 | 0.165467 | |
| 104 | 2 | c | -0.149594 | -0.149793 | 0.999884 | 0.059193 | |
| 104 | 2 | d | -0.592005 | -0.566358 | 0.996800 | -1.637171 | |
| 104 | 2 | e | -0.426036 | -0.409160 | 0.991247 | -0.624896 | |
| 104 | 2 | f | -0.577165 | -0.537765 | 0.994746 | -1.892411 | |
| 104 | 2 | g | -0.595353 | -0.566049 | 0.996284 | -1.723080 | |
| 104 | 2 | h | -0.178700 | -0.147296 | 0.995153 | -1.440278 | |
| 104 | 2 | j | -0.472299 | -0.453364 | 0.995866 | -1.032890 | |
| 104 | 2 | l | -0.017455 | -0.014014 | 0.999954 | -1.610789 | |
| 104 | 2 | m | -0.565612 | -0.543397 | 0.996573 | -1.378252 | |
| 104 | 2 | n | -0.384919 | -0.342904 | 0.991613 | -1.522880 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

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A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## NOMINAL SUBSTITUTES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 107 | 1 | a | -0.269170 | -0.269170 | 1.000000 | 0.000000 | |
| 107 | 1 | d | -0.361714 | -0.348075 | 0.997812 | -0.901149 | |
| 107 | 1 | e | -0.001095 | -0.001095 | 1.000000 | 0.000000 | |
| 107 | 1 | h | 0.152533 | 0.152817 | 0.999998 | -0.678450 | |
| 107 | 1 | j | -0.185056 | -0.180054 | 0.999474 | -0.645763 | |
| 107 | 1 | m | -0.327307 | -0.319678 | 0.998527 | -0.610309 | |
| 107 | 1 | n | -0.283932 | -0.282114 | 0.999427 | -0.230839 | |
| 107 | 2 | a | -0.290729 | -0.290729 | 1.000000 | 0.000000 | |
| 107 | 2 | b | -0.285007 | -0.285007 | 1.000000 | 0.000000 | |
| 107 | 2 | c | -0.292260 | -0.292260 | 1.000000 | 0.000000 | |
| 107 | 2 | d | -0.356617 | -0.340723 | 0.996884 | -0.878567 | |
| 107 | 2 | e | -0.001095 | -0.001095 | 1.000000 | 0.000000 | |
| 107 | 2 | f | -0.357481 | -0.340285 | 0.996814 | -0.938955 | |
| 107 | 2 | g | -0.356079 | -0.339461 | 0.995661 | -0.887019 | |
| 107 | 2 | h | 0.182394 | 0.181934 | 0.999988 | 0.394991 | |
| 107 | 2 | j | -0.089937 | -0.085541 | 0.999382 | -0.517402 | |
| 107 | 2 | l | 0.074758 | 0.074394 | 0.999998 | 0.696253 | |
| 107 | 2 | m | -0.315778 | -0.306067 | 0.997986 | -0.661291 | |
| 107 | 2 | n | -0.296199 | -0.292580 | 0.999205 | -0.390968 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## NOMINAL SUBSTITUTES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 109 | 1 | a | -0.220519 | -0.220519 | 1.000000 | 0.000000 | |
| 109 | 1 | d | -0.360544 | -0.375424 | 0.997808 | 1.286514 | |
| 109 | 1 | e | -0.000545 | -0.000545 | 1.000000 | 0.000000 | |
| 109 | 1 | h | -0.066046 | -0.067629 | 0.999875 | 0.539338 | |
| 109 | 1 | j | -0.131462 | -0.119429 | 0.998371 | -1.143141 | |
| 109 | 1 | m | -0.328732 | -0.328888 | 0.996127 | 0.010069 | |
| 109 | 1 | n | -0.358384 | -0.353895 | 0.992131 | -0.206230 | |
| 109 | 2 | a | -0.228134 | -0.228134 | 1.000000 | 0.000000 | |
| 109 | 2 | b | -0.233510 | -0.233510 | 1.000000 | 0.000000 | |
| 109 | 2 | c | -0.234593 | -0.234593 | 1.000000 | 0.000000 | |
| 109 | 2 | d | -0.285177 | -0.298763 | 0.997576 | 1.093045 | |
| 109 | 2 | e | -0.000545 | -0.000545 | 1.000000 | 0.000000 | |
| 109 | 2 | f | -0.293837 | -0.303923 | 0.998215 | 0.948744 | |
| 109 | 2 | g | -0.289566 | -0.302522 | 0.997656 | 1.061412 | |
| 109 | 2 | h | -0.068850 | -0.069777 | 0.999947 | 0.483698 | |
| 109 | 2 | j | -0.125951 | -0.120007 | 0.999550 | -1.073770 | |
| 109 | 2 | l | -0.069214 | -0.070290 | 0.998914 | 0.124573 | |
| 109 | 2 | m | -0.296651 | -0.296048 | 0.996755 | -0.042274 | |
| 109 | 2 | n | -0.330370 | -0.322610 | 0.993413 | -0.384951 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

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A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## NOMINAL SUBSTITUTES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 135 | 1 | a | -0.590694 | -0.600904 | 0.999613 | 1.704237 | |
| 135 | 1 | d | -0.797236 | -0.798253 | 0.999966 | 0.806227 | |
| 135 | 1 | e | -0.001234 | -0.001234 | 1.000000 | 0.000000 | |
| 135 | 1 | h | -0.026503 | -0.035626 | 0.998908 | 0.805472 | |
| 135 | 1 | j | -0.633972 | -0.644212 | 0.980281 | 0.276514 | |
| 135 | 1 | m | -0.796876 | -0.800067 | 0.999716 | 0.876231 | |
| 135 | 1 | n | -0.842132 | -0.811076 | 0.995357 | -1.829803 | |
| 135 | 2 | a | -0.637630 | -0.648359 | 0.999258 | 1.390371 | |
| 135 | 2 | b | -0.647093 | -0.652380 | 0.999766 | 1.247222 | |
| 135 | 2 | c | -0.635240 | -0.644584 | 0.999466 | 1.418114 | |
| 135 | 2 | d | -0.818316 | -0.819110 | 0.999765 | 0.261931 | |
| 135 | 2 | e | -0.001234 | -0.001234 | 1.000000 | 0.000000 | |
| 135 | 2 | f | -0.818960 | -0.818926 | 0.999918 | -0.019273 | |
| 135 | 2 | g | -0.816188 | -0.817176 | 0.999821 | 0.370452 | |
| 135 | 2 | h | -0.001788 | -0.002120 | 0.999993 | 1.315987 | |
| 135 | 2 | j | -0.766710 | -0.778213 | 0.995618 | 0.773603 | |
| 135 | 2 | l | -0.001329 | -0.001392 | 1.000000 | 0.479305 | |
| 135 | 2 | m | -0.813643 | -0.816604 | 0.999662 | 0.781532 | |
| 135 | 2 | n | -0.826860 | -0.797563 | 0.995690 | -1.778178 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

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# A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## NOMINAL SUBSTITUTES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 142 | 1 | a | -0.192139 | -0.189532 | 0.999963 | -1.337336 | |
| 142 | 1 | d | -0.255597 | -0.296225 | 0.979321 | 0.502495 | |
| 142 | 1 | e | -0.000662 | -0.000662 | 1.000000 | 0.000000 | |
| 142 | 1 | h | -0.277455 | -0.249532 | 0.915207 | -0.306799 | |
| 142 | 1 | j | -0.318605 | -0.306749 | 0.918706 | -0.135216 | |
| 142 | 1 | m | -0.304107 | -0.288012 | 0.995506 | -0.771676 | |
| 142 | 1 | n | -0.211922 | -0.180804 | 0.992868 | -1.154098 | |
| 142 | 2 | a | -0.324310 | -0.321402 | 0.999945 | -1.265263 | |
| 142 | 2 | b | -0.435620 | -0.434607 | 0.999992 | -1.209647 | |
| 142 | 2 | c | -0.355980 | -0.353568 | 0.999961 | -1.251661 | |
| 142 | 2 | d | -0.339456 | -0.373569 | 0.976897 | 0.737341 | |
| 142 | 2 | e | -0.000662 | -0.000662 | 1.000000 | 0.000000 | |
| 142 | 2 | f | -0.452453 | -0.472702 | 0.979268 | 0.487727 | |
| 142 | 2 | g | -0.352275 | -0.385374 | 0.976469 | 0.712576 | |
| 142 | 2 | h | -0.277419 | -0.054444 | 0.218294 | -0.805042 | |
| 142 | 2 | j | -0.316247 | -0.345299 | 0.916169 | 0.328365 | |
| 142 | 2 | l | -0.255325 | -0.002208 | 0.398154 | -1.037952 | |
| 142 | 2 | m | -0.359307 | -0.348560 | 0.998619 | -0.943022 | |
| 142 | 2 | n | -0.254817 | -0.238696 | 0.995236 | -0.741030 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## NOMINAL SUBSTITUTES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 158 | 1 | a | 0.038318 | 0.037274 | 0.999861 | 0.234405 | |
| 158 | 1 | d | -0.162911 | -0.167073 | 0.999889 | 1.058125 | |
| 158 | 1 | e | -0.001032 | -0.001032 | 1.000000 | 0.000000 | |
| 158 | 1 | h | -0.261133 | -0.268308 | 0.999643 | 1.034222 | |
| 158 | 1 | j | -0.172847 | -0.187003 | 0.991193 | 0.405551 | |
| 158 | 1 | m | -0.212637 | -0.221989 | 0.999772 | 1.656869 | |
| 158 | 1 | n | -0.190370 | -0.210136 | 0.992971 | 0.635701 | |
| 158 | 2 | a | 0.090669 | 0.089328 | 0.999809 | 0.257478 | |
| 158 | 2 | b | 0.174475 | 0.173910 | 0.999972 | 0.285531 | |
| 158 | 2 | c | 0.116130 | 0.115103 | 0.999875 | 0.244216 | |
| 158 | 2 | d | -0.113967 | -0.115931 | 0.999840 | 0.413479 | |
| 158 | 2 | e | -0.001032 | -0.001032 | 1.000000 | 0.000000 | |
| 158 | 2 | f | 0.016314 | 0.014657 | 0.999962 | 0.711746 | |
| 158 | 2 | g | -0.089306 | -0.091100 | 0.999877 | 0.429229 | |
| 158 | 2 | h | -0.136551 | -0.175037 | 0.997409 | 2.004835 | (**** |
| 158 | 2 | j | -0.103790 | -0.120490 | 0.998705 | 1.233151 | |
| 158 | 2 | l | -0.007262 | -0.020390 | 0.999677 | 1.932696 | |
| 158 | 2 | m | -0.131206 | -0.139479 | 0.999815 | 1.617782 | |
| 158 | 2 | n | -0.120778 | -0.136954 | 0.996159 | 0.695833 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## NOMINAL SUBSTITUTES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 170 | 1 | a | -0.716613 | -0.716201 | 0.999987 | -0.500158 | |
| 170 | 1 | d | -0.731051 | -0.734416 | 0.998726 | 0.423922 | |
| 170 | 1 | e | -0.001109 | -0.001109 | 1.000000 | 0.000000 | |
| 170 | 1 | h | 0.166612 | 0.165178 | 0.999969 | 0.810368 | |
| 170 | 1 | j | -0.594562 | -0.600246 | 0.997641 | 0.447377 | |
| 170 | 1 | m | -0.636259 | -0.640931 | 0.998552 | 0.487940 | |
| 170 | 1 | n | -0.515708 | -0.523314 | 0.998513 | 0.704176 | |
| 170 | 2 | a | -0.678385 | -0.678112 | 0.999979 | -0.249519 | |
| 170 | 2 | b | -0.637558 | -0.637414 | 0.999996 | -0.274505 | |
| 170 | 2 | c | -0.678090 | -0.677830 | 0.999983 | -0.262757 | |
| 170 | 2 | d | -0.691708 | -0.696222 | 0.999350 | 0.742064 | |
| 170 | 2 | e | -0.001109 | -0.001109 | 1.000000 | 0.000000 | |
| 170 | 2 | f | -0.696939 | -0.699257 | 0.999797 | 0.687098 | |
| 170 | 2 | g | -0.689511 | -0.694292 | 0.999377 | 0.798120 | |
| 170 | 2 | h | 0.153761 | 0.153183 | 0.999984 | 0.454847 | |
| 170 | 2 | j | -0.553947 | -0.558604 | 0.999150 | 0.587486 | |
| 170 | 2 | l | 0.045678 | 0.045931 | 0.999997 | -0.476418 | |
| 170 | 2 | m | -0.623943 | -0.628105 | 0.999382 | 0.652716 | |
| 170 | 2 | n | -0.533728 | -0.539636 | 0.999363 | 0.841414 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks. then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### NOMINAL SUBSTITUTES

|  |  |  | Correlation Coefficients |  |  | Significance Level |  |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 180 | 1 | a | -0.297536 | -0.301480 | 0.999714 | 0.861202 |  |
| 180 | 1 | d | -0.475084 | -0.475553 | 0.994769 | 0.026111 |  |
| 180 | 1 | e | -0.484654 | -0.484153 | 0.994886 | -0.028340 |  |
| 180 | 1 | h | -0.234297 | -0.225405 | 0.993965 | -0.415622 |  |
| 180 | 1 | j | -0.395090 | -0.389419 | 0.997850 | -0.469120 |  |
| 180 | 1 | m | -0.473372 | -0.459382 | 0.993912 | -0.712245 |  |
| 180 | 1 | n | -0.428501 | -0.410778 | 0.996425 | -1.138991 |  |
| 180 | 2 | a | -0.219548 | -0.225084 | 0.999557 | 0.950939 |  |
| 180 | 2 | b | -0.157462 | -0.160095 | 0.999902 | 0.951170 |  |
| 180 | 2 | c | -0.213261 | -0.218094 | 0.999676 | 0.969378 |  |
| 180 | 2 | d | -0.475058 | -0.491692 | 0.996970 | 1.196160 |  |
| 180 | 2 | e | -0.434632 | -0.427009 | 0.987359 | -0.265615 |  |
| 180 | 2 | f | -0.393963 | -0.410412 | 0.999072 | 2.002848 | <**** |
| 180 | 2 | g | -0.468597 | -0.486036 | 0.997586 | 1.390247 |  |
| 180 | 2 | h | -0.352302 | -0.339907 | 0.967043 | -0.257435 |  |
| 180 | 2 | j | -0.449142 | -0.451712 | 0.998800 | 0.293474 |  |
| 180 | 2 | l | -0.126480 | -0.119456 | 0.996554 | -0.426230 |  |
| 180 | 2 | m | -0.476596 | -0.482945 | 0.997654 | 0.526265 |  |
| 180 | 2 | n | -0.445123 | -0.441612 | 0.998257 | -0.331234 |  |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

NOMINAL SUBSTITUTES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 182 | 1 | a | -0.194413 | -0.192936 | 0.999984 | -1.386175 | |
| 182 | 1 | d | -0.221779 | -0.205365 | 0.995631 | -0.949108 | |
| 182 | 1 | e | -0.000462 | -0.000462 | 1.000000 | 0.000000 | |
| 182 | 1 | h | 0.185728 | 0.189[illegible]37 | 0.999911 | -1.475952 | |
| 182 | 1 | j | -0.008062 | 0.023412 | 0.994536 | -1.593812 | |
| 182 | 1 | m | -0.187365 | -0.149671 | 0.990448 | -1.460139 | |
| 182 | 1 | n | -0.166005 | -0.120033 | 0.987143 | -1.530116 | |
| 182 | 2 | a | -0.174304 | -0.172579 | 0.999979 | -1.414123 | |
| 182 | 2 | b | -0.101067 | -0.100631 | 0.999999 | -1.424118 | |
| 182 | 2 | c | -0.137425 | -0.136297 | 0.999991 | -1.417226 | |
| 182 | 2 | d | -0.223362 | -0.214499 | 0.997090 | -0.629463 | |
| 182 | 2 | e | -0.037327 | -0.037327 | 1.000000 | 0.000000 | |
| 182 | 2 | f | -0.147249 | -0.143760 | 0.939023 | -0.422065 | |
| 182 | 2 | g | -0.195747 | -0.188411 | 0.997777 | -0.592810 | |
| 182 | 2 | h | 0.188673 | 0.190930 | 0.999964 | -1.425058 | |
| 182 | 2 | j | -0.009834 | 0.009050 | 0.994672 | -0.968134 | |
| 182 | 2 | l | 0.157129 | 0.158432 | 0.999989 | -1.458326 | |
| 182 | 2 | m | -0.198272 | -0.175150 | 0.994150 | -1.148751 | |
| 182 | 2 | n | -0.190478 | -0.159352 | 0.992020 | -1.320885 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

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A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## NOMINAL SUBSTITUTES

|  |  |  | Correlation Coefficients |  |  | Significance Level |  |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 184 | 1 | a | -0.132394 | -0.132581 | 0.999986 | 0.160857 |  |
| 184 | 1 | d | 0.129099 | 0.143653 | 0.993570 | -0.579173 |  |
| 184 | 1 | e | 0.064221 | 0.095041 | 0.988992 | -0.931832 |  |
| 184 | 1 | h | -0.045491 | -0.042586 | 0.999765 | -0.599713 |  |
| 184 | 1 | j | 0.003093 | 0.026350 | 0.994689 | -1.009440 |  |
| 184 | 1 | m | 0.080914 | 0.102501 | 0.993606 | -0.857047 |  |
| 184 | 1 | n | -0.007330 | 0.023365 | 0.992337 | -1.109195 |  |
| 184 | 2 | a | -0.148937 | -0.149158 | 0.999387 | 0.195327 |  |
| 184 | 2 | b | -0.139155 | -0.139231 | 0.999998 | 0.166794 |  |
| 184 | 2 | c | -0.145872 | -0.146048 | 0.999990 | 0.173707 |  |
| 184 | 2 | d | 0.128770 | 0.129955 | 0.986155 | -0.032134 |  |
| 184 | 2 | e | 0.142193 | 0.157319 | 0.994299 | -0.640365 |  |
| 184 | 2 | f | 0.039625 | 0.041512 | 0.986603 | -0.051580 |  |
| 184 | 2 | g | 0.121064 | 0.121775 | 0.985399 | -0.018749 |  |
| 184 | 2 | h | -0.032087 | -0.031778 | 0.999967 | -0.169428 |  |
| 184 | 2 | j | 0.038815 | 0.050309 | 0.994543 | -0.492561 |  |
| 184 | 2 | l | -0.004347 | -0.004208 | 1.000000 | -1.138199 |  |
| 184 | 2 | m | 0.076227 | 0.083962 | 0.990307 | -0.249245 |  |
| 184 | 2 | n | -0.024803 | -0.005680 | 0.995324 | -0.884545 |  |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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Page

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## PRO-VERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 101 | 1 | a | -0.424357 | -0.422512 | 0.999964 | -1.198307 | |
| 101 | 1 | d | -0.745425 | -0.751612 | 0.999041 | 1.047436 | |
| 101 | 1 | e | -0.338200 | -0.337852 | 0.999810 | -0.096571 | |
| 101 | 1 | h | -0.084690 | -0.079805 | 0.999592 | -0.874708 | |
| 101 | 1 | j | -0.605974 | -0.561823 | 0.988776 | -1.741399 | |
| 101 | 1 | m | -0.742554 | -0.746668 | 0.998558 | 0.579180 | |
| 101 | 1 | n | -0.692001 | -0.698717 | 0.998276 | 0.797335 | |
| 101 | 2 | a | -0.381796 | -0.379436 | 0.999941 | -1.188190 | |
| 101 | 2 | b | -0.328840 | -0.327643 | 0.999988 | -1.289199 | |
| 101 | 2 | c | -0.381283 | -0.379214 | 0.999955 | -1.185281 | |
| 101 | 2 | d | -0.701048 | -0.700325 | 0.999297 | -0.137691 | |
| 101 | 2 | e | -0.339941 | -0.339150 | 0.999428 | -0.126865 | |
| 101 | 2 | f | -0.662621 | -0.662366 | 0.998983 | -0.038515 | |
| 101 | 2 | g | -0.701503 | -0.700533 | 0.999215 | -0.175042 | |
| 101 | 2 | h | -0.031633 | -0.031677 | 0.999999 | 0.144143 | |
| 101 | 2 | j | -0.712239 | -0.707026 | 0.998583 | -0.698802 | |
| 101 | 2 | l | -0.001532 | -0.001532 | 1.000000 | 0.000000 | |
| 101 | 2 | m | -0.731639 | -0.729278 | 0.998978 | -0.388272 | |
| 101 | 2 | n | -0.741866 | -0.741931 | 0.998306 | 0.008552 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resclved Anaphors and User's Relevance Judgments: for Anaphoric Class

## PRO-VERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 103 | 1 | a | 0.146284 | 0.144978 | 0.999953 | 0.665002 | |
| 103 | 1 | d | -0.053992 | -0.053675 | 0.999990 | -0.340213 | |
| 103 | 1 | e | -0.000528 | -0.000528 | 1.000000 | 0.000000 | |
| 103 | 1 | h | -0.319705 | -0.319717 | 1.000000 | 0.549865 | |
| 103 | 1 | j | -0.316556 | -0.325296 | 0.997031 | 0.585491 | |
| 103 | 1 | m | -0.333513 | -0.331908 | 0.999771 | -0.388994 | |
| 103 | 1 | n | -0.327129 | -0.325747 | 0.999723 | -0.304195 | |
| 103 | 2 | a | 0.257744 | 0.256450 | 0.999941 | 0.602435 | |
| 103 | 2 | b | 0.295230 | 0.294689 | 0.999988 | 0.563265 | |
| 103 | 2 | c | 0.256569 | 0.255414 | 0.999951 | 0.592566 | |
| 103 | 2 | d | -0.003726 | -0.004524 | 0.999986 | 0.739381 | |
| 103 | 2 | e | -0.000528 | -0.000528 | 1.000000 | 0.000000 | |
| 103 | 2 | f | 0.032856 | 0.032471 | 0.999997 | 0.739374 | |
| 103 | 2 | g | -0.008358 | -0.009076 | 0.999988 | 0.716084 | |
| 103 | 2 | h | -0.314465 | -0.314490 | 1.000000 | 1.123470 | |
| 103 | 2 | j | -0.350808 | -0.356108 | 0.998673 | 0.537535 | |
| 103 | 2 | l | -0.249678 | -0.249678 | 1.000000 | 0.000000 | |
| 103 | 2 | m | -0.213815 | -0.215067 | 0.999865 | 0.381938 | |
| 103 | 2 | n | -0.242461 | -0.244068 | 0.999797 | 0.402552 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## PRO-VERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 104 | 1 | a | -0.071262 | -0.069419 | 0.999888 | -0.550944 | |
| 104 | 1 | d | -0.623340 | -0.624274 | 0.999945 | 0.507177 | |
| 104 | 1 | e | -0.429965 | -0.430780 | 0.999996 | 1.324326 | |
| 104 | 1 | h | -0.347650 | -0.347844 | 0.999996 | 0.324887 | |
| 104 | 1 | j | -0.470712 | -0.470223 | 0.999250 | -0.063888 | |
| 104 | 1 | m | -0.602159 | -0.602295 | 0.999842 | 0.042853 | |
| 104 | 1 | n | -0.415472 | -0.389484 | 0.994046 | -1.145408 | |
| 104 | 2 | a | -0.153981 | -0.152407 | 0.999840 | -0.397725 | |
| 104 | 2 | b | -0.161980 | -0.161479 | 0.999965 | -0.272674 | |
| 104 | 2 | c | -0.149594 | -0.148053 | 0.999868 | -0.428003 | |
| 104 | 2 | d | -0.592005 | -0.593053 | 0.999968 | 0.722383 | |
| 104 | 2 | e | -0.426036 | -0.427124 | 0.999991 | 1.241918 | |
| 104 | 2 | f | -0.577165 | -0.577729 | 0.999992 | 0.761764 | |
| 104 | 2 | g | -0.595353 | -0.596328 | 0.999972 | 0.713880 | |
| 104 | 2 | h | -0.178700 | -0.179395 | 0.999995 | 1.020076 | |
| 104 | 2 | j | -0.472299 | -0.475769 | 0.999810 | 0.891137 | |
| 104 | 2 | l | -0.017455 | -0.017564 | 1.000000 | 1.230416 | |
| 104 | 2 | m | -0.565612 | -0.565814 | 0.999955 | 0.115405 | |
| 104 | 2 | n | -0.384919 | -0.358337 | 0.995359 | -1.305987 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### PRO-VERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 107 | 1 | a | -0.269170 | -0.269170 | 1.000000 | 0.000000 | |
| 107 | 1 | d | -0.361714 | -0.362459 | 0.999991 | 0.775989 | |
| 107 | 1 | e | -0.001095 | -0.001095 | 1.000000 | 0.000000 | |
| 107 | 1 | h | 0.152533 | 0.152809 | 0.999998 | -0.657191 | |
| 107 | 1 | j | -0.185056 | -0.186681 | 0.999945 | 0.652383 | |
| 107 | 1 | m | -0.327307 | -0.329823 | 0.999947 | 1.052114 | |
| 107 | 1 | n | -0.283932 | -0.287654 | 0.999870 | 0.985711 | |
| 107 | 2 | a | -0.290729 | -0.290729 | 1.000000 | 0.000000 | |
| 107 | 2 | b | -0.285007 | -0.285007 | 1.000000 | 0.000000 | |
| 107 | 2 | c | -0.292260 | -0.292260 | 1.000000 | 0.000000 | |
| 107 | 2 | d | -0.356617 | -0.357489 | 0.999989 | 0.803241 | |
| 107 | 2 | e | -0.001095 | -0.001095 | 1.000000 | 0.000000 | |
| 107 | 2 | f | -0.357481 | -0.357901 | 0.999997 | 0.789957 | |
| 107 | 2 | g | -0.356079 | -0.356867 | 0.999991 | 0.801685 | |
| 107 | 2 | h | 0.182394 | 0.181926 | 0.999988 | 0.401789 | |
| 107 | 2 | j | -0.089937 | -0.092925 | 0.999868 | 0.760167 | |
| 107 | 2 | l | 0.074758 | 0.074394 | 0.999998 | 0.696253 | |
| 107 | 2 | m | -0.315778 | -0.317798 | 0.999955 | 0.916822 | |
| 107 | 2 | n | -0.296199 | -0.299332 | 0.999907 | 0.985588 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## PRO-VERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 109 | 1 | a | -0.220519 | -0.220519 | 1.000000 | 0.000000 | |
| 109 | 1 | d | -0.360544 | -0.361494 | 0.999989 | 1.173908 | |
| 109 | 1 | e | -0.000545 | -0.000545 | 1.000000 | 0.000000 | |
| 109 | 1 | h | -0.066046 | -0.067282 | 0.999885 | 0.440498 | |
| 109 | 1 | j | -0.131462 | -0.115245 | 0.998777 | -1.775086 | |
| 109 | 1 | m | -0.328732 | -0.311233 | 0.998681 | -1.899918 | |
| 109 | 1 | n | -0.358384 | -0.330916 | 0.996632 | -1.878653 | |
| 109 | 2 | a | -0.228134 | -0.228134 | 1.000000 | 0.000000 | |
| 109 | 2 | b | -0.233510 | -0.233510 | 1.000000 | 0.000000 | |
| 109 | 2 | c | -0.234593 | -0.234593 | 1.000000 | 0.000000 | |
| 109 | 2 | d | -0.285177 | -0.285957 | 0.999995 | 1.320403 | |
| 109 | 2 | e | -0.000545 | -0.000545 | 1.000000 | 0.000000 | |
| 109 | 2 | f | -0.293837 | -0.294256 | 0.999998 | 1.295906 | |
| 109 | 2 | g | -0.289566 | -0.290261 | 0.999996 | 1.317980 | |
| 109 | 2 | h | -0.068850 | -0.069368 | 0.999962 | 0.319351 | |
| 109 | 2 | j | -0.125951 | -0.116716 | 0.999744 | -2.204416 | <**** |
| 109 | 2 | l | -0.069214 | -0.070142 | 0.998916 | 0.107587 | |
| 109 | 2 | m | -0.296651 | -0.281933 | 0.999048 | -1.868668 | |
| 109 | 2 | n | -0.330370 | -0.304518 | 0.997145 | -1.906291 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### PRO-VERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 135 | 1 | a | -0.590694 | -0.600904 | 0.999613 | 1.704237 | |
| 135 | 1 | d | -0.797236 | -0.798217 | 0.999967 | 0.792067 | |
| 135 | 1 | e | -0.001234 | -0.001234 | 1.000000 | 0.000000 | |
| 135 | 1 | h | -0.026503 | -0.035626 | 0.998908 | 0.005472 | |
| 135 | 1 | j | -0.633972 | -0.644208 | 0.960286 | 0.276535 | |
| 135 | 1 | m | -0.756876 | -0.800037 | 0.999717 | 0.870626 | |
| 135 | 1 | n | -0.842132 | -0.811056 | 0.995354 | -1.830233 | |
| 135 | 2 | a | -0.637630 | -0.648359 | 0.999258 | 1.390371 | |
| 135 | 2 | b | -0.647093 | -0.652380 | 0.999766 | 1.247222 | |
| 135 | 2 | c | -0.635240 | -0.644584 | 0.999466 | 1.418114 | |
| 135 | 2 | d | -0.818316 | -0.819090 | 0.999769 | 0.257540 | |
| 135 | 2 | e | -0.001234 | -0.001234 | 1.000000 | 0.000000 | |
| 135 | 2 | f | -0.818960 | -0.818917 | 0.999919 | -0.024199 | |
| 135 | 2 | g | -0.816188 | -0.817158 | 0.999824 | 0.366650 | |
| 135 | 2 | h | -0.001788 | -0.002120 | 0.999999 | 1.315987 | |
| 135 | 2 | j | -0.766710 | -0.778185 | 0.995625 | 0.772382 | |
| 135 | 2 | l | -0.001329 | -0.001392 | 1.000000 | 0.479305 | |
| 135 | 2 | m | -0.813643 | -0.816586 | 0.999667 | 0.782069 | |
| 135 | 2 | n | -0.826860 | -0.797568 | 0.995694 | -1.778553 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

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TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## PRO-VERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 142 | 1 | a | -0.192139 | -0.189532 | 0.999963 | -1.337336 | |
| 142 | 1 | d | -0.255597 | -0.257921 | 0.999885 | 0.690355 | |
| 142 | 1 | e | -0.000662 | -0.000662 | 1.000000 | 0.000000 | |
| 142 | 1 | h | -0.277455 | -0.209714 | 0.780641 | -0.461590 | |
| 142 | 1 | j | -0.318605 | -0.290542 | 0.824939 | -0.218007 | |
| 142 | 1 | m | -0.304107 | -0.243396 | 0.954047 | -0.905335 | |
| 142 | 1 | n | -0.211922 | -0.112039 | 0.938905 | -1.263212 | |
| 142 | 2 | a | -0.324310 | -0.321402 | 0.999945 | -1.265263 | |
| 142 | 2 | b | -0.435620 | -0.434607 | 0.999992 | -1.209647 | |
| 142 | 2 | c | -0.355980 | -0.353568 | 0.999961 | -1.251661 | |
| 142 | 2 | d | -0.339456 | -0.340976 | 0.999884 | 0.462161 | |
| 142 | 2 | e | -0.000662 | -0.000662 | 1.000000 | 0.000000 | |
| 142 | 2 | f | -0.452453 | -0.453093 | 0.999974 | 0.429176 | |
| 142 | 2 | g | -0.352275 | -0.353638 | 0.999907 | 0.464213 | |
| 142 | 2 | h | -0.277419 | -0.027069 | 0.120421 | -0.853365 | |
| 142 | 2 | j | -0.316247 | -0.335038 | 0.799655 | 0.137673 | |
| 142 | 2 | l | -0.255325 | -0.001435 | 0.395597 | -1.038994 | |
| 142 | 2 | m | -0.359307 | -0.321676 | 0.959040 | -0.608619 | |
| 142 | 2 | n | -0.254817 | -0.194305 | 0.943510 | -0.804963 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## PRO-VERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 158 | 1 | a | 0.038318 | 0.037274 | 0.999861 | 0.234405 | |
| 158 | 1 | d | -0.162911 | -0.163220 | 0.999985 | 0.217269 | |
| 158 | 1 | e | -0.001032 | -0.001032 | 1.000000 | 0.000000 | |
| 158 | 1 | h | -0.261133 | -0.268308 | 0.999643 | 1.034222 | |
| 158 | 1 | j | -0.172847 | -0.185305 | 0.991290 | 0.358875 | |
| 158 | 1 | m | -0.212637 | -0.219746 | 0.999828 | 1.451400 | |
| 158 | 1 | n | -0.190370 | -0.209590 | 0.992926 | 0.616191 | |
| 158 | 2 | a | 0.090669 | 0.089328 | 0.999809 | 0.257478 | |
| 158 | 2 | b | 0.174475 | 0.173910 | 0.999972 | 0.285531 | |
| 158 | 2 | c | 0.116130 | 0.115103 | 0.999875 | 0.244216 | |
| 158 | 2 | d | -0.113967 | -0.114001 | 0.999868 | 0.007984 | |
| 158 | 2 | e | -0.001032 | -0.001032 | 1.000000 | 0.000000 | |
| 158 | 2 | f | 0.016314 | 0.015779 | 0.999971 | 0.262813 | |
| 158 | 2 | g | -0.089306 | -0.089416 | 0.999898 | 0.028958 | |
| 158 | 2 | h | -0.136551 | -0.175037 | 0.997409 | 2.004835 | (**** |
| 158 | 2 | j | -0.103790 | -0.118837 | 0.998761 | 1.136096 | |
| 158 | 2 | l | -0.007262 | -0.020390 | 0.999677 | 1.932696 | |
| 158 | 2 | m | -0.131206 | -0.137808 | 0.999848 | 1.426312 | |
| 158 | 2 | n | -0.120778 | -0.135942 | 0.996106 | 0.647920 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## PRO-VERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 170 | 1 | a | -0.716613 | -0.716201 | 0.999987 | -0.500158 | |
| 170 | 1 | d | -0.731051 | -0.729330 | 0.999896 | -0.744580 | |
| 170 | 1 | e | -0.001109 | -0.001109 | 1.000000 | 0.000000 | |
| 170 | 1 | h | 0.166612 | 0.165300 | 0.999969 | 0.738479 | |
| 170 | 1 | j | -0.594562 | -0.595376 | 0.999847 | 0.252098 | |
| 170 | 1 | m | -0.636259 | -0.635420 | 0.999983 | -0.789984 | |
| 170 | 1 | n | -0.515708 | -0.516671 | 0.999991 | 1.138468 | |
| 170 | 2 | a | -0.678385 | -0.678112 | 0.999979 | -0.249519 | |
| 170 | 2 | b | -0.637558 | -0.637414 | 0.999996 | -0.274505 | |
| 170 | 2 | c | -0.678050 | -0.677830 | 0.999983 | -0.262757 | |
| 170 | 2 | d | -0.691708 | -0.690993 | 0.999972 | -0.570539 | |
| 170 | 2 | e | -0.001109 | -0.001109 | 1.000000 | 0.000000 | |
| 170 | 2 | f | -0.696939 | -0.696486 | 0.999991 | -0.628686 | |
| 170 | 2 | g | -0.689511 | -0.688913 | 0.999978 | -0.532944 | |
| 170 | 2 | h | 0.153761 | 0.153380 | 0.999986 | 0.312437 | |
| 170 | 2 | j | -0.553947 | -0.553885 | 0.999891 | -0.022236 | |
| 170 | 2 | l | 0.045678 | 0.046002 | 0.999997 | -0.622328 | |
| 170 | 2 | m | -0.623943 | -0.623468 | 0.999987 | -0.515001 | |
| 170 | 2 | n | -0.533728 | -0.534747 | 0.999992 | 1.281938 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### PRO-VERBS

| Q | S | TW | Correlation Coefficients<br>$r_{ju}$ | <br>$r_{jr}$ | <br>$r_{ur}$ | Significance Level<br>Z | <br>$p > .05$ |
|---|---|---|---|---|---|---|---|
| 182 | 1 | a | -0.194413 | -0.192936 | 0.999984 | -1.386175 | |
| 182 | 1 | d | -0.221779 | -0.204120 | 0.997707 | -1.405551 | |
| 182 | 1 | e | -0.000462 | -0.000462 | 1.000000 | 0.000000 | |
| 182 | 1 | h | 0.185728 | 0.185760 | 0.999990 | -0.037143 | |
| 182 | 1 | j | -0.008062 | 0.012035 | 0.996180 | -1.216836 | |
| 182 | 1 | m | -0.187365 | -0.156366 | 0.992670 | -1.371693 | |
| 182 | 1 | n | -0.166005 | -0.131268 | 0.990061 | -1.316344 | |
| 182 | 2 | a | -0.174304 | -0.172579 | 0.999979 | -1.414123 | |
| 182 | 2 | b | -0.101067 | -0.100631 | 0.999999 | -1.424118 | |
| 182 | 2 | c | -0.137425 | -0.136297 | 0.999991 | -1.417226 | |
| 182 | 2 | d | -0.223362 | -0.207851 | 0.998328 | -1.446237 | |
| 182 | 2 | e | -0.037327 | -0.037327 | 1.000000 | 0.000000 | |
| 182 | 2 | f | -0.147249 | -0.138295 | 0.999463 | -1.457952 | |
| 182 | 2 | g | -0.195747 | -0.181985 | 0.998714 | -1.456521 | |
| 182 | 2 | h | 0.188673 | 0.186046 | 0.999861 | 0.846242 | |
| 182 | 2 | j | -0.009834 | 0.008408 | 0.995247 | -0.990165 | |
| 182 | 2 | l | 0.157129 | 0.156170 | 0.999965 | 0.615318 | |
| 182 | 2 | m | -0.198272 | -0.172524 | 0.994889 | -1.367066 | |
| 182 | 2 | n | -0.190478 | -0.161261 | 0.992680 | -1.294802 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### PRO-VERBS

|  |  |  | Correlation Coefficients |  |  | Significance Level |  |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 180 | 1 | a | -0.297536 | -0.299409 | 0.999723 | 0.416233 |  |
| 180 | 1 | d | -0.475084 | -0.485908 | 0.999376 | 1.677809 |  |
| 180 | 1 | e | -0.484654 | -0.484654 | 1.000000 | 0.000000 |  |
| 180 | 1 | h | -0.234297 | -0.250428 | 0.998063 | 1.327498 |  |
| 180 | 1 | j | -0.395090 | -0.398504 | 0.998871 | 0.390883 |  |
| 180 | 1 | m | -0.473372 | -0.482114 | 0.999679 | 1.868891 |  |
| 180 | 1 | n | -0.428501 | -0.432483 | 0.999846 | 1.235124 |  |
| 180 | 2 | a | -0.219548 | -0.222590 | 0.999568 | 0.530523 |  |
| 180 | 2 | b | -0.157462 | -0.159036 | 0.999904 | 0.573887 |  |
| 180 | 2 | c | -0.213261 | -0.215989 | 0.999684 | 0.554789 |  |
| 180 | 2 | d | -0.475058 | -0.487901 | 0.999342 | 1.914103 |  |
| 180 | 2 | e | -0.434632 | -0.434632 | 1.000000 | 0.000000 |  |
| 180 | 2 | f | -0.393963 | -0.404198 | 0.999606 | 1.916450 |  |
| 180 | 2 | g | -0.468597 | -0.481172 | 0.999380 | 1.925501 |  |
| 180 | 2 | h | -0.352302 | -0.377404 | 0.991004 | 0.997600 |  |
| 180 | 2 | j | -0.449142 | -0.454957 | 0.999533 | 1.051901 |  |
| 180 | 2 | l | -0.126480 | -0.138984 | 0.999041 | 1.437095 |  |
| 180 | 2 | m | -0.476596 | -0.486384 | 0.999647 | 1.983032 | <**** |
| 180 | 2 | n | -0.445123 | --0.450480 | 0.999766 | 1.353539 |  |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### PRO-VERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 184 | 1 | a | -0.132394 | -0.132581 | 0.999986 | 0.160857 | |
| 184 | 1 | d | 0.129099 | 0.129805 | 0.999996 | -1.072488 | |
| 184 | 1 | e | 0.064221 | 0.064221 | 1.000000 | 0.000000 | |
| 184 | 1 | h | -0.045491 | -0.045478 | 0.999958 | -0.006535 | |
| 184 | 1 | j | 0.003093 | 0.006652 | 0.999801 | -0.797005 | |
| 184 | 1 | m | 0.080914 | 0.082766 | 0.999986 | -1.588080 | |
| 184 | 1 | n | -0.007330 | -0.002700 | 0.999864 | -1.256942 | |
| 184 | 2 | a | -0.148937 | -0.149158 | 0.999987 | 0.195327 | |
| 184 | 2 | b | -0.139155 | -0.139231 | 0.999998 | 0.166794 | |
| 184 | 2 | c | -0.145872 | -0.146048 | 0.999990 | 0.173707 | |
| 184 | 2 | d | 0.128770 | 0.129277 | 0.999996 | -0.851096 | |
| 184 | 2 | e | 0.142193 | 0.142193 | 1.000000 | 0.000000 | |
| 184 | 2 | f | 0.039625 | 0.039735 | 0.999999 | -0.414221 | |
| 184 | 2 | g | 0.121064 | 0.121514 | 0.999997 | -0.832490 | |
| 184 | 2 | h | -0.032087 | -0.033874 | 0.999309 | 0.215014 | |
| 184 | 2 | j | 0.038815 | 0.039882 | 0.999887 | -0.317027 | |
| 184 | 2 | l | -0.004347 | -0.004624 | 0.999980 | 0.195383 | |
| 184 | 2 | m | 0.076227 | 0.076962 | 0.999980 | -0.516291 | |
| 184 | 2 | n | -0.024803 | -0.022960 | 0.999965 | -0.983740 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## INDEFINITES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 101 | 1 | a | -0.424357 | -0.422512 | 0.999964 | -1.198307 | |
| 101 | 1 | d | -0.745425 | -0.752322 | 0.997931 | 0.808034 | |
| 101 | 1 | e | -0.338200 | -0.341814 | 0.999590 | 0.682320 | |
| 101 | 1 | h | -0.084690 | -0.079382 | 0.999586 | -0.943369 | |
| 101 | 1 | j | -0.605974 | -0.560459 | 0.986712 | -1.659860 | |
| 101 | 1 | m | -0.742554 | -0.741852 | 0.996874 | -0.067649 | |
| 101 | 1 | n | -0.692001 | -0.683252 | 0.996031 | -0.681516 | |
| 101 | 2 | a | -0.381796 | -0.379436 | 0.999941 | -1.188190 | |
| 101 | 2 | b | -0.328840 | -0.327643 | 0.999988 | -1.289199 | |
| 101 | 2 | c | -0.381283 | -0.379214 | 0.999955 | -1.185281 | |
| 101 | 2 | d | -0.701048 | -0.695983 | 0.997959 | -0.560160 | |
| 101 | 2 | e | -0.339941 | -0.344668 | 0.998915 | 0.549529 | |
| 101 | 2 | f | -0.662621 | -0.656817 | 0.997499 | -0.552888 | |
| 101 | 2 | g | -0.701503 | -0.695683 | 0.997813 | -0.621423 | |
| 101 | 2 | h | -0.031633 | -0.031647 | 0.999998 | 0.040856 | |
| 101 | 2 | j | -0.712239 | -0.696749 | 0.997213 | -1.405118 | |
| 101 | 2 | l | -0.001532 | -0.001532 | 1.000000 | 0.000000 | |
| 101 | 2 | m | -0.731639 | -0.720449 | 0.997470 | -1.121817 | |
| 101 | 2 | n | -0.741866 | -0.722653 | 0.996692 | -1.620531 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### INDEFINITES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 103 | 1 | a | 0.146284 | 0.144978 | 0.999953 | 0.665002 | |
| 103 | 1 | d | -0.053992 | -0.066044 | 0.999426 | 1.743908 | |
| 103 | 1 | e | -0.000528 | -0.000528 | 1.000000 | 0.000000 | |
| 103 | 1 | h | -0.319705 | -0.319743 | 1.000000 | 1.210674 | |
| 103 | 1 | j | -0.316556 | -0.329609 | 0.996832 | 0.844967 | |
| 103 | 1 | m | -0.333513 | -0.344174 | 0.999021 | 1.241036 | |
| 103 | 1 | n | -0.327129 | -0.336017 | 0.999064 | 1.058705 | |
| 103 | 2 | a | 0.257744 | 0.256450 | 0.999941 | 0.602435 | |
| 103 | 2 | b | 0.295230 | 0.294689 | 0.999988 | 0.563265 | |
| 103 | 2 | c | 0.256569 | 0.255414 | 0.999951 | 0.592566 | |
| 103 | 2 | d | -0.003726 | -0.010393 | 0.999842 | 1.837296 | |
| 103 | 2 | e | -0.000528 | -0.000528 | 1.000000 | 0.000000 | |
| 103 | 2 | f | 0.032856 | 0.029448 | 0.999957 | 1.801669 | |
| 103 | 2 | g | -0.008358 | -0.014515 | 0.999866 | 1.844286 | |
| 103 | 2 | h | -0.314465 | -0.314500 | 1.000000 | 1.429243 | |
| 103 | 2 | j | -0.350808 | -0.358694 | 0.998611 | 0.780180 | |
| 103 | 2 | l | -0.249678 | -0.249678 | 1.000000 | 0.000000 | |
| 103 | 2 | m | -0.213815 | -0.221119 | 0.999677 | 1.433116 | |
| 103 | 2 | n | -0.242461 | -0.249939 | 0.999593 | 1.316620 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## INDEFINITES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 104 | 1 | a | -0.071262 | -0.071204 | 0.999904 | -0.018778 | |
| 104 | 1 | d | -0.623340 | -0.627242 | 0.999709 | 0.905140 | |
| 104 | 1 | e | -0.429965 | -0.432473 | 0.999958 | 1.318606 | |
| 104 | 1 | h | -0.347650 | -0.347405 | 0.999997 | -0.486152 | |
| 104 | 1 | j | -0.470712 | -0.468763 | 0.999504 | -0.313059 | |
| 104 | 1 | m | -0.602159 | -0.602996 | 0.999857 | 0.276386 | |
| 104 | 1 | n | -0.415472 | -0.384340 | 0.994260 | -1.385639 | |
| 104 | 2 | a | -0.153981 | -0.154278 | 0.999859 | 0.080141 | |
| 104 | 2 | b | -0.161980 | -0.162270 | 0.999969 | 0.165467 | |
| 104 | 2 | c | -0.149594 | -0.149793 | 0.999884 | 0.059193 | |
| 104 | 2 | d | -0.592005 | -0.594546 | 0.999882 | 0.899312 | |
| 104 | 2 | e | -0.426036 | -0.428956 | 0.999934 | 1.235247 | |
| 104 | 2 | f | -0.577165 | -0.578412 | 0.999972 | 0.888252 | |
| 104 | 2 | g | -0.595353 | -0.597809 | 0.999891 | 0.908231 | |
| 104 | 2 | h | -0.178700 | -0.179124 | 0.999996 | 0.679858 | |
| 104 | 2 | j | -0.472299 | -0.476056 | 0.999869 | 1.151360 | |
| 104 | 2 | l | -0.017455 | -0.017455 | 1.000000 | 0.000000 | |
| 104 | 2 | m | -0.565612 | -0.566576 | 0.999931 | 0.443463 | |
| 104 | 2 | n | -0.384919 | -0.357451 | 0.995310 | -1.341035 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

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Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### INDEFINITES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 107 | 1 | a | -0.269170 | -0.269170 | 1.000000 | 0.000000 | |
| 107 | 1 | d | -0.361714 | -0.362459 | 0.999991 | 0.775989 | |
| 107 | 1 | e | -0.001095 | -0.001095 | 1.000000 | 0.000000 | |
| 107 | 1 | h | 0.152533 | 0.152809 | 0.999998 | -0.657191 | |
| 107 | 1 | j | -0.185056 | -0.186681 | 0.999945 | 0.652383 | |
| 107 | 1 | m | -0.327307 | -0.329823 | 0.999947 | 1.052114 | |
| 107 | 1 | n | -0.283932 | -0.287654 | 0.999870 | 0.985711 | |
| 107 | 2 | a | -0.290729 | -0.290729 | 1.000000 | 0.000000 | |
| 107 | 2 | b | -0.285007 | -0.285007 | 1.000000 | 0.000000 | |
| 107 | 2 | c | -0.292260 | -0.292260 | 1.000000 | 0.000000 | |
| 107 | 2 | d | -0.356617 | -0.357489 | 0.999989 | 0.803241 | |
| 107 | 2 | e | -0.001095 | -0.001095 | 1.000000 | 0.000000 | |
| 107 | 2 | f | -0.357481 | -0.357901 | 0.999997 | 0.789957 | |
| 107 | 2 | g | -0.356079 | -0.356867 | 0.999991 | 0.801685 | |
| 107 | 2 | h | 0.182394 | 0.181926 | 0.999988 | 0.401789 | |
| 107 | 2 | j | -0.089937 | -0.092925 | 0.999868 | 0.760167 | |
| 107 | 2 | l | 0.074758 | 0.074394 | 0.999998 | 0.696253 | |
| 107 | 2 | m | -0.315778 | -0.317798 | 0.999955 | 0.916822 | |
| 107 | 2 | n | -0.296199 | -0.299332 | 0.999907 | 0.985588 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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Page

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## INDEFINITES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 109 | 1 | a | -0.220519 | -0.219931 | 0.999868 | -0.199317 | |
| 109 | 1 | d | -0.360544 | -0.360360 | 0.999729 | -0.045736 | |
| 109 | 1 | e | -0.000545 | -0.000545 | 1.000000 | 0.000000 | |
| 109 | 1 | h | -0.066046 | -0.066351 | 0.999942 | 0.152409 | |
| 109 | 1 | j | -0.131462 | -0.122050 | 0.999671 | -1.984724 | (**** |
| 109 | 1 | m | -0.328732 | -0.323165 | 0.997027 | -0.410927 | |
| 109 | 1 | n | -0.358384 | -0.342772 | 0.995164 | -0.908314 | |
| 109 | 2 | a | -0.228134 | -0.227383 | 0.999846 | -0.237046 | |
| 109 | 2 | b | -0.233510 | -0.233074 | 0.999920 | -0.190643 | |
| 109 | 2 | c | -0.234593 | -0.233846 | 0.999866 | -0.253052 | |
| 109 | 2 | d | -0.285177 | -0.286415 | 0.999469 | 0.213575 | |
| 109 | 2 | e | -0.000545 | -0.000545 | 1.000000 | 0.000000 | |
| 109 | 2 | f | -0.293837 | -0.294547 | 0.999285 | 0.105794 | |
| 109 | 2 | g | -0.289566 | -0.290706 | 0.999402 | 0.185584 | |
| 109 | 2 | h | -0.068850 | -0.068648 | 0.999993 | -0.284085 | |
| 109 | 2 | j | -0.125951 | -0.120357 | 0.999848 | -1.736169 | |
| 109 | 2 | l | -0.069214 | -0.069423 | 0.999747 | 0.050043 | |
| 109 | 2 | m | -0.296651 | -0.281066 | 0.998933 | -1.869049 | |
| 109 | 2 | n | -0.330370 | -0.301879 | 0.996543 | -1.908738 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### INDEFINITES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 135 | 1 | a | -0.590694 | -0.600904 | 0.999613 | 1.704237 | |
| 135 | 1 | d | -0.797236 | -0.772840 | 0.991218 | -1.140052 | |
| 135 | 1 | e | -0.001234 | -0.001234 | 1.000000 | 0.000000 | |
| 135 | 1 | h | -0.026503 | -0.035609 | 0.998909 | 0.803948 | |
| 135 | 1 | j | -0.633972 | -0.637440 | 0.980311 | 0.093623 | |
| 135 | 1 | m | -0.796876 | -0.778377 | 0.996115 | -1.275569 | |
| 135 | 1 | n | -0.842132 | -0.795701 | 0.992775 | -2.013543 | <**** |
| 135 | 2 | a | -0.637630 | -0.648359 | 0.999258 | 1.390371 | |
| 135 | 2 | b | -0.647093 | -0.652380 | 0.999766 | 1.247222 | |
| 135 | 2 | c | -0.635240 | -0.644584 | 0.999466 | 1.418114 | |
| 135 | 2 | d | -0.818316 | -0.809892 | 0.995072 | -0.591501 | |
| 135 | 2 | e | -0.001234 | -0.001234 | 1.000000 | 0.000000 | |
| 135 | 2 | f | -0.818960 | -0.817350 | 0.998138 | -0.188927 | |
| 135 | 2 | g | -0.816188 | -0.807974 | 0.996205 | -0.650900 | |
| 135 | 2 | h | -0.001788 | -0.002120 | 0.999999 | 1.315987 | |
| 135 | 2 | j | -0.766710 | -0.761965 | 0.993959 | -0.275507 | |
| 135 | 2 | l | -0.001329 | -0.001392 | 1.000000 | 0.479305 | |
| 135 | 2 | m | -0.813643 | -0.807226 | 0.996486 | -0.530789 | |
| 135 | 2 | n | -0.826860 | -0.797037 | 0.995023 | -1.717193 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### INDEFINITES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 142 | 1 | a | -0.192139 | -0.189532 | 0.999963 | -1.337336 | |
| 142 | 1 | d | -0.255597 | -0.269432 | 0.939431 | 1.819247 | |
| 142 | 1 | e | -0.000662 | -0.000662 | 1.000000 | 0.000000 | |
| 142 | 1 | h | -0.277455 | -0.209714 | 0.780641 | -0.461590 | |
| 142 | 1 | j | -0.318605 | -0.291969 | 0.824910 | -0.206963 | |
| 142 | 1 | m | -0.304107 | -0.254739 | 0.955165 | -0.747293 | |
| 142 | 1 | n | -0.211922 | -0.120100 | 0.940354 | -1.175800 | |
| 142 | 2 | a | -0.324310 | -0.321402 | 0.999945 | -1.265263 | |
| 142 | 2 | b | -0.435620 | -0.434607 | 0.999992 | -1.209647 | |
| 142 | 2 | c | -0.355980 | -0.353568 | 0.999961 | -1.251661 | |
| 142 | 2 | d | -0.339456 | -0.346993 | 0.999751 | 1.532558 | |
| 142 | 2 | e | -0.000662 | -0.000662 | 1.000000 | 0.000000 | |
| 142 | 2 | f | -0.452453 | -0.455626 | 0.999944 | 1.419687 | |
| 142 | 2 | g | -0.352275 | -0.359016 | 0.999799 | 1.531634 | |
| 142 | 2 | h | -0.277419 | -0.027069 | 0.120421 | -0.853365 | |
| 142 | 2 | j | -0.316247 | -0.338219 | 0.799887 | 0.161175 | |
| 142 | 2 | i | -0.255325 | -0.001435 | 0.395597 | -1.038994 | |
| 142 | 2 | m | -0.359307 | -0.327471 | 0.959547 | -0.519066 | |
| 142 | 2 | n | -0.254817 | -0.198757 | 0.944209 | -0.750871 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### INDEFINITES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 158 | 1 | a | 0.038318 | 0.037274 | 0.999861 | 0.234405 | |
| 158 | 1 | d | -0.162911 | -0.168945 | 0.999338 | 0.628346 | |
| 158 | 1 | e | -0.001032 | -0.001032 | 1.000000 | 0.000000 | |
| 158 | 1 | h | -0.261133 | -0.268266 | 0.999657 | 1.047834 | |
| 158 | 1 | j | -0.172847 | -0.188528 | 0.991179 | 0.448889 | |
| 158 | 1 | m | -0.212637 | -0.224449 | 0.999513 | 1.436359 | |
| 158 | 1 | n | -0.190370 | -0.210847 | 0.992773 | 0.649489 | |
| 158 | 2 | a | 0.090669 | 0.089328 | 0.999809 | 0.257478 | |
| 158 | 2 | b | 0.174475 | 0.173910 | 0.999972 | 0.285531 | |
| 158 | 2 | c | 0.116130 | 0.115103 | 0.999875 | 0.244216 | |
| 158 | 2 | d | -0.113967 | -0.127840 | 0.996101 | 0.591873 | |
| 158 | 2 | e | -0.001032 | -0.001032 | 1.000000 | 0.000000 | |
| 158 | 2 | f | 0.016314 | 0.000194 | 0.996324 | 0.703471 | |
| 158 | 2 | g | -0.089306 | -0.104073 | 0.995964 | 0.617744 | |
| 158 | 2 | h | -0.136551 | -0.174185 | 0.997516 | 2.002268 | (**** |
| 158 | 2 | j | -0.103790 | -0.126435 | 0.997999 | 1.345056 | |
| 158 | 2 | l | -0.007262 | -0.020129 | 0.999681 | 1.904769 | |
| 158 | 2 | m | -0.131206 | -0.148421 | 0.997938 | 1.010909 | |
| 158 | 2 | n | -0.120778 | -0.138368 | 0.995899 | 0.732335 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

Page

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## INDEFINITES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 170 | 1 | a | -0.716613 | -0.716201 | 0.999987 | -0.500158 | |
| 170 | 1 | c | -0.731051 | -0.729927 | 0.999868 | -0.437500 | |
| 170 | 1 | e | -0.001109 | -0.001109 | 1.000000 | 0.000000 | |
| 170 | 1 | h | 0.166612 | 0.165325 | 0.999969 | 0.718610 | |
| 170 | 1 | j | -0.594562 | -0.600554 | 0.998838 | 0.667406 | |
| 170 | 1 | m | -0.636259 | -0.636255 | 0.999905 | -0.001826 | |
| 170 | 1 | n | -0.515708 | -0.518841 | 0.999802 | 0.790715 | |
| 170 | 2 | a | -0.678385 | -0.678112 | 0.999979 | -0.249519 | |
| 170 | 2 | b | -0.637558 | -0.637414 | 0.999996 | -0.274505 | |
| 170 | 2 | c | -0.678030 | -0.677830 | 0.999983 | -0.262757 | |
| 170 | 2 | d | -0.691708 | -0.691445 | 0.999960 | -0.177914 | |
| 170 | 2 | e | -0.001109 | -0.001109 | 1.000000 | 0.000000 | |
| 170 | 2 | f | -0.696939 | -0.696701 | 0.999988 | -0.288599 | |
| 170 | 2 | g | -0.689511 | -0.689362 | 0.999967 | -0.110845 | |
| 170 | 2 | h | 0.153761 | 0.153339 | 0.999985 | 0.343563 | |
| 170 | 2 | j | -0.553947 | -0.555406 | 0.999790 | 0.372142 | |
| 170 | 2 | i | 0.045678 | 0.045931 | 0.999397 | -0.476422 | |
| 170 | 2 | m | -0.623943 | -0.624053 | 0.999959 | 0.067787 | |
| 170 | 2 | n | -0.533728 | -0.535895 | 0.999932 | 0.941700 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's pred' ations of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### INDEFINITES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 180 | 1 | a | -0.297536 | -0.299409 | 0.999723 | 0.416233 | |
| 180 | 1 | d | -0.475084 | -0.485505 | 0.996877 | 0.746074 | |
| 180 | 1 | e | -0.484654 | -0.483529 | 0.999452 | -0.194078 | |
| 180 | 1 | h | -0.234297 | -0.250120 | 0.998018 | 1.287587 | |
| 180 | 1 | j | -0.395090 | -0.397840 | 0.997360 | 0.206057 | |
| 180 | 1 | m | -0.473372 | -0.482802 | 0.996953 | 0.683441 | |
| 180 | 1 | n | -0.428501 | -0.436343 | 0.997985 | 0.681462 | |
| 180 | 2 | a | -0.219548 | -0.222590 | 0.999568 | 0.530523 | |
| 180 | 2 | b | -0.157462 | -0.159036 | 0.999904 | 0.573887 | |
| 180 | 2 | c | -0.213261 | -0.215989 | 0.999684 | 0.554789 | |
| 180 | 2 | d | -0.475058 | -0.497852 | 0.998381 | 2.139282 | <**** |
| 180 | 2 | e | -0.434632 | -0.431416 | 0.998580 | -0.334327 | |
| 180 | 2 | f | -0.393963 | -0.417118 | 0.998748 | 2.385579 | <**** |
| 180 | 2 | g | -0.468597 | -0.492359 | 0.998440 | 2.249597 | <**** |
| 180 | 2 | h | -0.352302 | -0.377037 | 0.990957 | 0.980613 | |
| 180 | 2 | j | -0.449142 | -0.459918 | 0.999212 | 1.482148 | |
| 180 | 2 | l | -0.126480 | -0.138760 | 0.999033 | 1.405832 | |
| 180 | 2 | m | -0.476596 | -0.494443 | 0.998821 | 1.982610 | <**** |
| 180 | 2 | n | -0.445123 | -0.457971 | 0.998923 | 1.508164 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## INDEFINITES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 182 | 1 | a | -0.194413 | -0.192936 | 0.999984 | -1.386175 | |
| 182 | 1 | d | -0.221779 | -0.220375 | 0.999972 | -1.021391 | |
| 182 | 1 | e | -0.000462 | -0.000462 | 1.000000 | 0.000000 | |
| 182 | 1 | h | 0.185728 | 0.184857 | 0.999994 | 1.386589 | |
| 182 | 1 | j | -0.008062 | -0.013225 | 0.999832 | 1.491479 | |
| 182 | 1 | m | -0.187365 | -0.186776 | 0.999827 | -0.170309 | |
| 182 | 1 | n | -0.166005 | -0.167819 | 0.999863 | 0.587933 | |
| 182 | 2 | a | -0.174304 | -0.172579 | 0.999979 | -1.414123 | |
| 182 | 2 | b | -0.101067 | -0.100631 | 0.999999 | -1.424118 | |
| 182 | 2 | c | -0.137425 | -0.136297 | 0.999991 | -1.417226 | |
| 182 | 2 | d | -0.223362 | -0.221788 | 0.999982 | -1.432104 | |
| 182 | 2 | e | -0.037327 | -0.037327 | 1.000000 | 0.000000 | |
| 182 | 2 | f | -0.147249 | -0.146781 | 0.999998 | -1.400394 | |
| 182 | 2 | g | -0.195747 | -0.194583 | 0.999990 | -1.385283 | |
| 182 | 2 | h | 0.188673 | 0.184829 | 0.999864 | 1.251626 | |
| 182 | 2 | j | -0.009834 | -0.018578 | 0.999581 | 1.598529 | |
| 182 | 2 | i | 0.157129 | 0.155412 | 0.999968 | 1.140827 | |
| 182 | 2 | m | -0.198272 | -0.197672 | 0.999900 | -0.228425 | |
| 182 | 2 | n | -0.190478 | -0.192268 | 0.999884 | 0.633289 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

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Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### INDEFINITES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 184 | 1 | a | -0.132394 | -0.132581 | 0.999986 | 0.160857 | |
| 184 | 1 | d | 0.129099 | 0.127115 | 0.999601 | 0.316625 | |
| 184 | 1 | e | 0.064221 | 0.062900 | 0.999970 | 0.768734 | |
| 184 | 1 | h | -0.045491 | -0.045629 | 0.999958 | 0.067423 | |
| 184 | 1 | j | 0.003093 | 0.006609 | 0.998948 | -0.342742 | |
| 184 | 1 | m | 0.080914 | 0.080696 | 0.998909 | 0.020933 | |
| 184 | 1 | n | -0.007330 | -0.003656 | 0.999516 | -0.527994 | |
| 184 | 2 | a | -0.148937 | -0.149158 | 0.999987 | 0.195327 | |
| 184 | 2 | b | -0.139155 | -0.139231 | 0.999998 | 0.166794 | |
| 184 | 2 | c | -0.145872 | -0.146048 | 0.999990 | 0.173707 | |
| 184 | 2 | d | 0.128770 | 0.128098 | 0.999892 | 0.206697 | |
| 184 | 2 | e | 0.142193 | 0.140976 | 0.999974 | 0.763283 | |
| 184 | 2 | f | 0.039625 | 0.039648 | 0.999976 | -0.014669 | |
| 184 | 2 | g | 0.121064 | 0.120505 | 0.999914 | 0.192686 | |
| 184 | 2 | h | -0.032087 | -0.034065 | 0.999303 | 0.237118 | |
| 184 | 2 | j | 0.038815 | 0.039566 | 0.999590 | -0.117423 | |
| 184 | 2 | l | -0.004347 | -0.004624 | 0.999980 | 0.195383 | |
| 184 | 2 | m | 0.076227 | 0.076297 | 0.999811 | -0.016219 | |
| 184 | 2 | n | -0.024803 | -0.023155 | 0.999903 | -0.527956 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## RESIDUAL ADJECTIVES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 101 | 1 | a | -0.424357 | -0.422512 | 0.999964 | -1.198307 | |
| 101 | 1 | d | -0.745425 | -0.751612 | 0.999041 | 1.047436 | |
| 101 | 1 | e | -0.338200 | -0.337852 | 0.999810 | -0.096571 | |
| 101 | 1 | h | -0.084690 | -0.079805 | 0.999592 | -0.874708 | |
| 101 | 1 | j | -0.605974 | -0.561823 | 0.988776 | -1.741399 | |
| 101 | 1 | m | -0.742554 | -0.746668 | 0.998558 | 0.579180 | |
| 101 | 1 | n | -0.692001 | -0.698717 | 0.998276 | 0.797335 | |
| 101 | 2 | a | -0.381796 | -0.379436 | 0.999941 | -1.188190 | |
| 101 | 2 | b | -0.328840 | -0.327643 | 0.999988 | -1.289199 | |
| 101 | 2 | c | -0.381283 | -0.379214 | 0.999955 | -1.185281 | |
| 101 | 2 | d | -0.701048 | -0.700325 | 0.999297 | -0.137691 | |
| 101 | 2 | e | -0.339941 | -0.339150 | 0.999428 | -0.126865 | |
| 101 | 2 | f | -0.662621 | -0.662366 | 0.998983 | -0.038515 | |
| 101 | 2 | g | -0.701503 | -0.700533 | 0.999215 | -0.175042 | |
| 101 | 2 | h | -0.031633 | -0.031677 | 0.999999 | 0.144143 | |
| 101 | 2 | j | -0.712239 | -0.707026 | 0.998583 | -0.698802 | |
| 101 | 2 | l | -0.001532 | -0.001532 | 1.000000 | 0.000000 | |
| 101 | 2 | m | -0.731639 | -0.729278 | 0.998978 | -0.388272 | |
| 101 | 2 | n | -0.741866 | -0.741931 | 0.998306 | 0.008552 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## RESIDUAL ADJECTIVES

|  |  |  | Correlation Coefficients |  |  | Significance Level |  |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 103 | 1 | a | 0.146284 | 0.144978 | 0.999953 | 0.665002 |  |
| 103 | 1 | d | -0.053992 | -0.051487 | 0.999946 | -1.182141 |  |
| 103 | 1 | e | -0.000528 | -0.000528 | 1.000000 | 0.000000 |  |
| 103 | 1 | h | -0.319705 | -0.320319 | 0.999982 | 0.527310 |  |
| 103 | 1 | j | -0.316556 | -0.326918 | 0.996357 | 0.626573 |  |
| 103 | 1 | m | -0.333513 | -0.327510 | 0.999260 | -0.817553 |  |
| 103 | 1 | n | -0.327129 | -0.321477 | 0.999546 | -0.965824 |  |
| 103 | 2 | a | 0.257744 | 0.256450 | 0.999941 | 0.602435 |  |
| 103 | 2 | b | 0.295230 | 0.294689 | 0.999988 | 0.563265 |  |
| 103 | 2 | c | 0.256569 | 0.255414 | 0.999951 | 0.592566 |  |
| 103 | 2 | d | -0.003726 | -0.003883 | 0.999982 | 0.126814 |  |
| 103 | 2 | e | -0.000328 | -0.000528 | 1.000000 | 0.000000 |  |
| 103 | 2 | f | 0.032856 | 0.032771 | 0.999996 | 0.142771 |  |
| 103 | 2 | g | -0.008358 | -0.008464 | 0.999984 | 0.091623 |  |
| 103 | 2 | h | -0.314465 | -0.315726 | 0.999959 | 0.717689 |  |
| 103 | 2 | j | -0.350808 | -0.356913 | 0.998329 | 0.551869 |  |
| 103 | 2 | l | -0.249678 | -0.249491 | 0.999991 | -0.220407 |  |
| 103 | 2 | m | -0.213815 | -0.213207 | 0.999812 | -0.157101 |  |
| 103 | 2 | n | -0.242461 | -0.242560 | 0.999784 | 0.024196 |  |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## RESIDUAL ADJECTIVES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 104 | 1 | a | -0.071262 | -0.071204 | 0.999904 | -0.018778 | |
| 104 | 1 | d | -0.623340 | -0.623721 | 0.999985 | 0.401482 | |
| 104 | 1 | e | -0.429965 | -0.430780 | 0.999996 | 1.324326 | |
| 104 | 1 | h | -0.347650 | -0.347405 | 0.999997 | -0.486152 | |
| 104 | 1 | j | -0.470712 | -0.467840 | 0.999363 | -0.406482 | |
| 104 | 1 | m | -0.602159 | -0.600803 | 0.999930 | -0.636572 | |
| 104 | 1 | n | -0.415472 | -0.383766 | 0.994267 | -1.410728 | |
| 104 | 2 | a | -0.153981 | -0.154278 | 0.999859 | 0.080141 | |
| 104 | 2 | b | -0.161980 | -0.162270 | 0.999969 | 0.165467 | |
| 104 | 2 | c | -0.149594 | -0.149793 | 0.999884 | 0.059193 | |
| 104 | 2 | d | -0.592005 | -0.592818 | 0.999973 | 0.505450 | |
| 104 | 2 | e | -0.426036 | -0.427124 | 0.999991 | 1.241918 | |
| 104 | 2 | f | -0.577165 | -0.577596 | 0.999993 | 0.633143 | |
| 104 | 2 | g | -0.595353 | -0.596113 | 0.999976 | 0.600343 | |
| 104 | 2 | h | -0.178700 | -0.179124 | 0.999996 | 0.679858 | |
| 104 | 2 | j | -0.472299 | -0.475148 | 0.999825 | 0.766603 | |
| 104 | 2 | l | -0.017455 | -0.017455 | 1.000000 | 0.000000 | |
| 104 | 2 | m | -0.565612 | -0.565380 | 0.999964 | -0.148670 | |
| 104 | 2 | n | -0.384919 | -0.356937 | 0.995318 | -1.366158 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## RESIDUAL ADJECTIVES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 107 | 1 | a | -0.269170 | -0.269170 | 1.000000 | 0.000000 | |
| 107 | 1 | d | -0.361714 | -0.366005 | 0.999845 | 1.064491 | |
| 107 | 1 | e | -0.001095 | -0.001095 | 1.000000 | 0.000000 | |
| 107 | 1 | h | 0.152533 | 0.152809 | 0.999998 | -0.657191 | |
| 107 | 1 | j | -0.185056 | -0.187224 | 0.999938 | 0.815546 | |
| 107 | 1 | m | -0.327307 | -0.331679 | 0.999883 | 1.231026 | |
| 107 | 1 | n | -0.283932 | -0.288712 | 0.999849 | 1.171721 | |
| 107 | 2 | a | -0.290729 | -0.290729 | 1.000000 | 0.000000 | |
| 107 | 2 | b | -0.285007 | -0.285007 | 1.000000 | 0.000000 | |
| 107 | 2 | c | -0.292260 | -0.292260 | 1.000000 | 0.000000 | |
| 107 | 2 | d | -0.356617 | -0.358899 | 0.999966 | 1.199868 | |
| 107 | 2 | e | -0.001095 | -0.001095 | 1.000000 | 0.000000 | |
| 107 | 2 | f | -0.357481 | -0.358801 | 0.999988 | 1.194389 | |
| 107 | 2 | g | -0.356079 | -0.358155 | 0.999972 | 1.198332 | |
| 107 | 2 | h | 0.182394 | 0.181926 | 0.999988 | 0.401789 | |
| 107 | 2 | j | -0.089337 | -0.093350 | 0.999861 | 0.846109 | |
| 107 | 2 | i | 0.074758 | 0.074394 | 0.999938 | 0.696253 | |
| 107 | 2 | m | -0.315778 | -0.318551 | 0.999941 | 1.099238 | |
| 107 | 2 | n | -0.296199 | -0.293772 | 0.999901 | 1.084805 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## RESIDUAL ADJECTIVES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 109 | 1 | a | -0.220519 | -0.220519 | 1.000000 | 0.000000 | |
| 109 | 1 | d | -0.360544 | -0.360341 | 0.999978 | -0.176233 | |
| 109 | 1 | e | -0.000545 | -0.000545 | 1.000000 | 0.000000 | |
| 109 | 1 | h | -0.066046 | -0.066833 | 0.999878 | 0.271868 | |
| 109 | 1 | j | -0.131462 | -0.115245 | 0.998777 | -1.775086 | |
| 109 | 1 | m | -0.328732 | -0.307707 | 0.998562 | -2.172109 | (**** |
| 109 | 1 | n | -0.358384 | -0.327905 | 0.996556 | -2.051845 | (**** |
| 109 | 2 | a | -0.228134 | -0.228134 | 1.000000 | 0.000000 | |
| 109 | 2 | b | -0.233510 | -0.233510 | 1.000000 | 0.000000 | |
| 109 | 2 | c | -0.234593 | -0.234593 | 1.000000 | 0.000000 | |
| 109 | 2 | d | -0.285177 | -0.285164 | 0.999990 | -0.016233 | |
| 109 | 2 | e | -0.000545 | -0.000545 | 1.000000 | 0.000000 | |
| 109 | 2 | f | -0.293837 | -0.293866 | 0.999997 | 0.069221 | |
| 109 | 2 | g | -0.289566 | -0.289553 | 0.999992 | -0.017410 | |
| 109 | 2 | h | -0.068850 | -0.069122 | 0.999959 | 0.162325 | |
| 109 | 2 | j | -0.125951 | -0.116716 | 0.999744 | -2.204416 | (**** |
| 109 | 2 | i | -0.069214 | -0.069945 | 0.998914 | 0.084582 | |
| 109 | 2 | m | -0.296651 | -0.280523 | 0.999037 | -2.030152 | (**** |
| 109 | 2 | n | -0.330370 | -0.303095 | 0.997139 | -2.004619 | (**** |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

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Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## RESIDUAL ADJECTIVES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 135 | 1 | a | -0.590694 | -0.600904 | 0.999613 | 1.704237 | |
| 135 | 1 | d | -0.797236 | -0.798253 | 0.999966 | 0.806227 | |
| 135 | 1 | e | -0.001234 | -0.001234 | 1.000000 | 0.000000 | |
| 135 | 1 | h | -0.026503 | -0.035626 | 0.998908 | 0.805472 | |
| 135 | 1 | j | -0.633972 | -0.644212 | 0.980281 | 0.276614 | |
| 135 | 1 | m | -0.796876 | -0.800067 | 0.999716 | 0.876231 | |
| 135 | 1 | n | -0.842132 | -0.811076 | 0.995357 | -1.829803 | |
| 135 | 2 | a | -0.637630 | -0.648359 | 0.999258 | 1.390371 | |
| 135 | 2 | b | -0.647093 | -0.652380 | 0.999766 | 1.247222 | |
| 135 | 2 | c | -0.635240 | -0.644584 | 0.999466 | 1.418114 | |
| 135 | 2 | d | -0.818316 | -0.819110 | 0.999765 | 0.261981 | |
| 135 | 2 | e | -0.001234 | -0.001234 | 1.000000 | 0.000000 | |
| 135 | 2 | f | -0.818960 | -0.818926 | 0.999918 | -0.019273 | |
| 135 | 2 | g | -0.816188 | -0.817176 | 0.999821 | 0.370452 | |
| 135 | 2 | h | -0.001788 | -0.002120 | 0.999999 | 1.315987 | |
| 135 | 2 | j | -0.766710 | -0.778213 | 0.995618 | 0.773603 | |
| 135 | 2 | i | -0.001329 | -0.001392 | 1.000000 | 0.479305 | |
| 135 | 2 | m | -0.813643 | -0.816604 | 0.999662 | 0.781532 | |
| 135 | 2 | n | -0.826860 | -0.797563 | 0.995690 | -1.778178 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

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Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

### A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## RESIDUAL ADJECTIVES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 142 | 1 | a | -0.192139 | -0.189532 | 0.999963 | -1.337336 | |
| 142 | 1 | d | -0.255597 | -0.257921 | 0.999885 | 0.690355 | |
| 142 | 1 | e | -0.000662 | -0.000662 | 1.000000 | 0.000000 | |
| 142 | 1 | h | -0.277455 | -0.209714 | 0.780641 | -0.461590 | |
| 142 | 1 | j | -0.318605 | -0.290542 | 0.824939 | -0.218007 | |
| 142 | 1 | m | -0.304107 | -0.243396 | 0.954047 | -0.905335 | |
| 142 | 1 | n | -0.211922 | -0.112039 | 0.938905 | -1.263212 | |
| 142 | 2 | a | -0.324310 | -0.321402 | 0.999945 | -1.265263 | |
| 142 | 2 | b | -0.435620 | -0.434607 | 0.999992 | -1.209647 | |
| 142 | 2 | c | -0.355980 | -0.353568 | 0.999961 | -1.251661 | |
| 142 | 2 | d | -0.339456 | -0.340976 | 0.999884 | 0.462161 | |
| 142 | 2 | e | -0.000662 | -0.000662 | 1.000000 | 0.000000 | |
| 142 | 2 | f | -0.452453 | -0.453093 | 0.999974 | 0.429176 | |
| 142 | 2 | g | -0.352275 | -0.353638 | 0.999907 | 0.464213 | |
| 142 | 2 | h | -0.277419 | -0.027069 | 0.120421 | -0.853365 | |
| 142 | 2 | j | -0.316247 | -0.335038 | 0.739655 | 0.137673 | |
| 142 | 2 | l | -0.255325 | -0.001435 | 0.395597 | -1.038994 | |
| 142 | 2 | m | -0.359307 | -0.321676 | 0.959040 | -0.608619 | |
| 142 | 2 | n | -0.254817 | -0.194305 | 0.943510 | -0.804963 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## RESIDUAL ADJECTIVES

|  |  |  | Correlation Coefficients |  |  | Significance Level |  |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 158 | 1 | a | 0.038318 | 0.037274 | 0.999861 | 0.234405 |  |
| 158 | 1 | c | -0.162911 | -0.164549 | 0.999945 | 0.593286 |  |
| 158 | 1 | e | -0.001032 | -0.001032 | 1.000000 | 0.000000 |  |
| 158 | 1 | h | -0.261133 | -0.268308 | 0.999643 | 1.034222 |  |
| 158 | 1 | j | -0.172847 | -0.187373 | 0.991239 | 0.417235 |  |
| 158 | 1 | m | -0.212637 | -0.221337 | 0.999757 | 1.496819 |  |
| 158 | 1 | n | -0.190370 | -0.210652 | 0.992794 | 0.644254 |  |
| 158 | 2 | a | 0.090669 | 0.089328 | 0.999809 | 0.257478 |  |
| 158 | 2 | b | 0.174475 | 0.173910 | 0.999972 | 0.285531 |  |
| 158 | 2 | c | 0.116130 | 0.115103 | 0.999875 | 0.244216 |  |
| 158 | 2 | d | -0.113967 | -0.113303 | 0.999831 | -0.136053 |  |
| 158 | 2 | e | -0.001032 | -0.001032 | 1.000000 | 0.000000 |  |
| 158 | 2 | f | 0.016314 | 0.016700 | 0.999829 | -0.078035 |  |
| 158 | 2 | g | -0.089306 | -0.088465 | 0.999836 | -0.174200 |  |
| 158 | 2 | h | -0.136551 | -0.175042 | 0.997408 | 2.004895 | (**** |
| 158 | 2 | j | -0.103790 | -0.119243 | 0.998767 | 1.169869 |  |
| 158 | 2 | l | -0.007262 | -0.020390 | 0.999677 | 1.932696 |  |
| 158 | 2 | m | -0.131206 | -0.137477 | 0.999837 | 1.307669 |  |
| 158 | 2 | n | -0.120778 | -0.136421 | 0.996092 | 0.667111 |  |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## RESIDUAL ADJECTIVES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 170 | 1 | a | -0.716613 | -0.716201 | 0.999987 | -0.500158 | |
| 170 | 1 | d | -0.731051 | -0.742090 | 0.993649 | 0.621921 | |
| 170 | 1 | e | -0.001109 | -0.001109 | 1.000000 | 0.000000 | |
| 170 | 1 | h | 0.166612 | 0.164412 | 0.999960 | 1.089657 | |
| 170 | 1 | j | -0.594562 | -0.614372 | 0.990243 | 0.764024 | |
| 170 | 1 | m | -0.636259 | -0.654478 | 0.992729 | 0.842953 | |
| 170 | 1 | n | -0.515708 | -0.541451 | 0.991535 | 0.994660 | |
| 170 | 2 | a | -0.678385 | -0.678112 | 0.999979 | -0.249519 | |
| 170 | 2 | b | -0.637558 | -0.637414 | 0.999996 | -0.274505 | |
| 170 | 2 | c | -0.678090 | -0.677830 | 0.999983 | -0.262757 | |
| 170 | 2 | d | -0.691708 | -0.707218 | 0.993231 | 0.794390 | |
| 170 | 2 | e | -0.001109 | -0.001109 | 1.000000 | 0.000000 | |
| 170 | 2 | f | -0.696939 | -0.713767 | 0.989529 | 0.703046 | |
| 170 | 2 | g | -0.689511 | -0.705860 | 0.992551 | 0.796411 | |
| 170 | 2 | h | 0.153761 | 0.152558 | 0.999978 | 0.801444 | |
| 170 | 2 | j | -0.553947 | -0.575755 | 0.988949 | 0.764538 | |
| 170 | 2 | l | 0.045678 | 0.045717 | 0.999997 | -0.067077 | |
| 170 | 2 | m | -0.623943 | -0.644082 | 0.991707 | 0.861803 | |
| 170 | 2 | n | -0.533728 | -0.560072 | 0.990025 | 0.951460 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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Page

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## RESIDUAL ADJECTIVES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 180 | 1 | a | -0.297536 | -0.300069 | 0.399718 | 0.558162 | |
| 180 | 1 | d | -0.475084 | -0.469676 | 0.997561 | -0.438159 | |
| 180 | 1 | e | -0.484654 | -0.484654 | 1.000000 | 0.000000 | |
| 180 | 1 | h | -0.234297 | -0.250499 | 0.938062 | 1.332840 | |
| 180 | 1 | j | -0.395090 | -0.391709 | 0.998332 | -0.318095 | |
| 180 | 1 | m | -0.473372 | -0.469709 | 0.998407 | -0.367378 | |
| 180 | 1 | n | -0.428501 | -0.426252 | 0.999451 | -0.374795 | |
| 180 | 2 | a | -0.219548 | -0.223547 | 0.999558 | 0.689100 | |
| 180 | 2 | b | -0.157462 | -0.159451 | 0.999902 | 0.719927 | |
| 180 | 2 | c | -0.213261 | -0.216810 | 0.999676 | 0.713390 | |
| 180 | 2 | d | -0.475058 | -0.463184 | 0.996392 | -0.785163 | |
| 180 | 2 | e | -0.434632 | -0.434632 | 1.000000 | 0.000000 | |
| 180 | 2 | f | -0.393963 | -0.372357 | 0.995482 | -1.214745 | |
| 180 | 2 | g | -0.468597 | -0.454845 | 0.996089 | -0.868267 | |
| 180 | 2 | h | -0.352302 | -0.377455 | 0.991003 | 0.999521 | |
| 180 | 2 | j | -0.449142 | -0.447423 | 0.999231 | -0.245109 | |
| 180 | 2 | l | -0.126480 | -0.138939 | 0.999040 | 1.431369 | |
| :80 | 2 | m | -0.476596 | -0.473019 | 0.998716 | -0.400072 | |
| 180 | 2 | n | -0.445123 | -0.445674 | 0.999652 | 0.116776 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### RESIDUAL ADJECTIVES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 182 | 1 | a | -0.194413 | -0.192936 | 0.999984 | -1.386175 | |
| 182 | 1 | d | -0.221779 | -0.204120 | 0.997707 | -1.405551 | |
| 182 | 1 | e | -0.000462 | -0.000462 | 1.000000 | 0.000000 | |
| 182 | 1 | h | 0.185728 | 0.185760 | 0.999990 | -0.037143 | |
| 182 | 1 | j | -0.008062 | 0.012035 | 0.996180 | -1.216836 | |
| 182 | 1 | m | -0.187365 | -0.156366 | 0.992670 | -1.371693 | |
| 182 | 1 | n | -0.166005 | -0.131268 | 0.990061 | -1.316344 | |
| 182 | 2 | a | -0.174304 | -0.172579 | 0.999979 | -1.414123 | |
| 182 | 2 | b | -0.101067 | -0.100631 | 0.999999 | -1.424118 | |
| 182 | 2 | c | -0.137425 | -0.136297 | 0.999991 | -1.417226 | |
| 182 | 2 | d | -0.223362 | -0.207851 | 0.998328 | -1.446237 | |
| 182 | 2 | e | -0.037327 | -0.037327 | 1.000000 | 0.000000 | |
| 182 | 2 | f | -0.147249 | -0.138295 | 0.999463 | -1.457952 | |
| 182 | 2 | g | -0.195747 | -0.181985 | 0.998714 | -1.456521 | |
| 182 | 2 | h | 0.188673 | 0.186046 | 0.999861 | 0.846242 | |
| 182 | 2 | j | -0.009834 | 0.008408 | 0.995247 | -0.990166 | |
| 182 | 2 | i | 0.157129 | 0.156170 | 0.999965 | 0.615318 | |
| 182 | 2 | m | -0.198272 | -0.172524 | 0.994889 | -1.367066 | |
| 182 | 2 | n | -0.190478 | -0.161261 | 0.992680 | -1.294802 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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### A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## RESIDUAL ADJECTIVES

|  |  |  | Correlation Coefficients |  |  | Significance Level |  |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 184 | 1 | a | -0.132394 | -0.132581 | 0.999986 | 0.160857 |  |
| 184 | 1 | d | 0.129099 | 0.136537 | 0.999522 | -1.083389 |  |
| 184 | 1 | e | 0.064221 | 0.064221 | 1.000000 | 0.000000 |  |
| 184 | 1 | h | -0.045491 | -0.045478 | 0.999958 | -0.006535 |  |
| 184 | 1 | j | 0.003093 | 0.008376 | 0.999761 | -1.079631 |  |
| 184 | 1 | m | 0.080914 | 0.087276 | 0.999714 | -1.193218 |  |
| 184 | 1 | n | -0.007330 | -0.002087 | 0.999859 | -1.396917 |  |
| 184 | 2 | a | -0.148937 | -0.149158 | 0.999987 | 0.195327 |  |
| 184 | 2 | b | -0.139155 | -0.139231 | 0.999998 | 0.166794 |  |
| 184 | 2 | c | -0.145872 | -0.146048 | 0.999990 | 0.173707 |  |
| 184 | 2 | d | 0.128770 | 0.133600 | 0.999816 | -1.133947 |  |
| 184 | 2 | e | 0.142193 | 0.142193 | 1.000000 | 0.000000 |  |
| 184 | 2 | f | 0.039625 | 0.042174 | 0.999919 | -0.897806 |  |
| 184 | 2 | g | 0.121064 | 0.125731 | 0.999819 | -1.103698 |  |
| 184 | 2 | h | -0.032087 | -0.033874 | 0.999309 | 0.215014 |  |
| 184 | 2 | j | 0.038815 | 0.041741 | 0.999831 | -0.712119 |  |
| 184 | 2 | l | -0.004347 | -0.004624 | 0.999980 | 0.195383 |  |
| 184 | 2 | m | 0.076227 | 0.079961 | 0.999855 | -0.982313 |  |
| 184 | 2 | n | -0.024803 | -0.022576 | 0.999962 | -1.138266 |  |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### ADVERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 101 | 1 | a | -0.424357 | -0.422512 | 0.999964 | -1.198307 | |
| 101 | 1 | d | -0.745425 | -0.750839 | 0.999025 | 0.916500 | |
| 101 | 1 | e | -0.338200 | -0.420617 | 0.951057 | 1.433873 | |
| 101 | 1 | h | -0.084690 | -0.072247 | 0.999203 | -1.593022 | |
| 101 | 1 | j | -0.605974 | -0.553144 | 0.985667 | -1.827722 | |
| 101 | 1 | m | -0.742554 | -0.740466 | 0.997804 | -0.239187 | |
| 101 | 1 | n | -0.692001 | -0.677530 | 0.991948 | -0.785997 | |
| 101 | 2 | a | -0.381796 | -0.379436 | 0.999941 | -1.188190 | |
| 101 | 2 | b | -0.328840 | -0.327643 | 0.999988 | -1.289199 | |
| 101 | 2 | c | -0.381283 | -0.379214 | 0.999955 | -1.185281 | |
| 101 | 2 | d | -0.701048 | -0.710868 | 0.998401 | 1.197970 | |
| 101 | 2 | e | -0.339941 | -0.413889 | 0.960234 | 1.424931 | |
| 101 | 2 | f | -0.662621 | -0.675150 | 0.997504 | 1.173007 | |
| 101 | 2 | g | -0.701503 | -0.711851 | 0.998177 | 1.184736 | |
| 101 | 2 | h | -0.031633 | -0.031561 | 0.999999 | -0.226240 | |
| 101 | 2 | j | -0.712239 | -0.711003 | 0.998551 | -0.166544 | |
| 101 | 2 | l | -0.001532 | -0.001532 | 1.000000 | 0.000000 | |
| 101 | 2 | m | -0.731639 | -0.736005 | 0.998631 | 0.619011 | |
| 101 | 2 | n | -0.741866 | -0.736241 | 0.997741 | -0.626018 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### ADVERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 103 | 1 | a | 0.146284 | 0.144978 | 0.999953 | 0.665002 | |
| 103 | 1 | d | -0.053992 | -0.080883 | 0.994353 | 1.242260 | |
| 103 | 1 | e | -0.000528 | -0.000528 | 1.000000 | 0.000000 | |
| 103 | 1 | h | -0.319705 | -0.319721 | 1.000000 | 0.111545 | |
| 103 | 1 | j | -0.316556 | -0.332959 | 0.996318 | 0.984024 | |
| 103 | 1 | m | -0.333513 | -0.353968 | 0.992094 | 0.844509 | |
| 103 | 1 | n | -0.327129 | -0.342995 | 0.991868 | 0.645213 | |
| 103 | 2 | a | 0.257744 | 0.256450 | 0.999941 | 0.602435 | |
| 103 | 2 | b | 0.295230 | 0.294689 | 0.999988 | 0.563265 | |
| 103 | 2 | c | 0.256569 | 0.255414 | 0.999951 | 0.592566 | |
| 103 | 2 | d | -0.003726 | -0.022769 | 0.997177 | 1.241748 | |
| 103 | 2 | e | -0.000528 | -0.000528 | 1.000000 | 0.000000 | |
| 103 | 2 | f | 0.032856 | 0.016124 | 0.997474 | 1.153621 | |
| 103 | 2 | g | -0.008358 | -0.028092 | 0.996915 | 1.231121 | |
| 103 | 2 | h | -0.314465 | -0.313860 | 0.999993 | -0.822045 | |
| 103 | 2 | j | -0.350808 | -0.363150 | 0.997681 | 0.943716 | |
| 103 | 2 | l | -0.249678 | -0.249466 | 1.000000 | -1.329759 | |
| 103 | 2 | m | -0.213815 | -0.235891 | 0.994566 | 1.061138 | |
| 103 | 2 | n | -0.242461 | -0.263263 | 0.993529 | 0.923036 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### ADVERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 104 | 1 | a | -0.071262 | -0.071204 | 0.999904 | -0.018778 | |
| 104 | 1 | d | -0.623340 | -0.622474 | 0.999659 | -0.189493 | |
| 104 | 1 | e | -0.429965 | -0.431091 | 0.999992 | 1.323283 | |
| 104 | 1 | h | -0.347650 | -0.368062 | 0.996505 | 1.154530 | |
| 104 | 1 | j | -0.470712 | -0.476799 | 0.997358 | 0.424038 | |
| 104 | 1 | m | -0.602159 | -0.605039 | 0.998952 | 0.351807 | |
| 104 | 1 | n | -0.415472 | -0.396591 | 0.988208 | -0.599432 | |
| 104 | 2 | a | -0.153981 | -0.154278 | 0.999859 | 0.080141 | |
| 104 | 2 | b | -0.161980 | -0.162270 | 0.999969 | 0.165467 | |
| 104 | 2 | c | -0.149594 | -0.149793 | 0.999884 | 0.059193 | |
| 104 | 2 | d | -0.592005 | -0.604637 | 0.997679 | 1.006654 | |
| 104 | 2 | e | -0.426036 | -0.427762 | 0.999977 | 1.239605 | |
| 104 | 2 | f | -0.577165 | -0.594427 | 0.996423 | 1.091747 | |
| 104 | 2 | g | -0.595353 | -0.608863 | 0.997278 | 0.997852 | |
| 104 | 2 | h | -0.178700 | -0.184904 | 0.999760 | 1.281626 | |
| 104 | 2 | j | -0.472299 | -0.492604 | 0.997362 | 1.379610 | |
| 104 | 2 | i | -0.017455 | -0.017892 | 0.999998 | 1.079241 | |
| 104 | 2 | m | -0.565612 | -0.581620 | 0.997540 | 1.201384 | |
| 104 | 2 | n | -0.384919 | -0.377151 | 0.988233 | -0.244910 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### ADVERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 107 | 1 | a | -0.269170 | -0.269170 | 1.000000 | 0.000000 | |
| 107 | 1 | d | -0.361714 | -0.374103 | 0.992962 | 0.462016 | |
| 107 | 1 | e | -0.001095 | -0.001095 | 1.000000 | 0.000000 | |
| 107 | 1 | h | 0.152533 | 0.132720 | 0.994950 | 0.820388 | |
| 107 | 1 | j | -0.185056 | -0.223991 | 0.989567 | 1.130729 | |
| 107 | 1 | m | -0.327307 | -0.343330 | 0.991538 | 0.537701 | |
| 107 | 1 | n | -0.283932 | -0.302328 | 0.994482 | 0.752152 | |
| 107 | 2 | a | -0.290729 | -0.290729 | 1.000000 | 0.000000 | |
| 107 | 2 | b | -0.285007 | -0.285007 | 1.000000 | 0.000000 | |
| 107 | 2 | c | -0.292260 | -0.292260 | 1.000000 | 0.000000 | |
| 107 | 2 | d | -0.356617 | -0.354579 | 0.997639 | -0.130842 | |
| 107 | 2 | e | -0.001095 | -0.001095 | 1.000000 | 0.000000 | |
| 107 | 2 | f | -0.357481 | -0.353567 | 0.998151 | -0.283723 | |
| 107 | 2 | g | -0.356079 | -0.353170 | 0.997673 | -0.187974 | |
| 107 | 2 | h | 0.182394 | 0.172443 | 0.997623 | 0.604073 | |
| 107 | 2 | j | -0.089937 | -0.110899 | 0.997084 | 1.136444 | |
| 107 | 2 | l | 0.074758 | 0.067997 | 0.999509 | 0.891345 | |
| 107 | 2 | m | -0.315778 | -0.318261 | 0.998623 | 0.206098 | |
| 107 | 2 | n | -0.296199 | -0.304222 | 0.998930 | 0.746373 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

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### ADVERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 109 | 1 | a | -0.220519 | -0.220519 | 1.000000 | 0.000000 | |
| 109 | 1 | d | -0.360544 | -0.397370 | 0.987902 | 1.360074 | |
| 109 | 1 | e | -0.000545 | -0.000545 | 1.000000 | 0.000000 | |
| 109 | 1 | h | -0.066046 | -0.067439 | 0.999885 | 0.496746 | |
| 109 | 1 | j | -0.131462 | -0.120445 | 0.998601 | -1.129571 | |
| 109 | 1 | m | -0.328732 | -0.334144 | 0.994099 | 0.284255 | |
| 109 | 1 | n | -0.358384 | -0.339139 | 0.995641 | -1.174331 | |
| 109 | 2 | a | -0.228134 | -0.228134 | 1.000000 | 0.000000 | |
| 109 | 2 | b | -0.233510 | -0.233510 | 1.000000 | 0.000000 | |
| 109 | 2 | c | -0.234593 | -0.234593 | 1.000000 | 0.000000 | |
| 109 | 2 | d | -0.285177 | -0.323096 | 0.985664 | 1.257465 | |
| 109 | 2 | e | -0.000545 | -0.000545 | 1.000000 | 0.000000 | |
| 109 | 2 | f | -0.293837 | -0.328449 | 0.988789 | 1.299676 | |
| 109 | 2 | g | -0.289566 | -0.327214 | 0.985987 | 1.264255 | |
| 109 | 2 | h | -0.068850 | -0.069508 | 0.999962 | 0.404447 | |
| 109 | 2 | j | -0.125951 | -0.121717 | 0.999514 | -0.736985 | |
| 109 | 2 | l | -0.069214 | -0.070241 | 0.998916 | 0.119081 | |
| 109 | 2 | m | -0.296651 | -0.306993 | 0.992316 | 0.470836 | |
| 109 | 2 | n | -0.330370 | -0.316870 | 0.993654 | -0.680503 | |

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A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## ADVERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 135 | 1 | a | -0.590694 | -0.600904 | 0.999613 | 1.704237 | |
| 135 | 1 | d | -0.797236 | -0.798217 | 0.999967 | 0.792067 | |
| 135 | 1 | e | -0.001234 | -0.001234 | 1.000000 | 0.000000 | |
| 135 | 1 | h | -0.026503 | -0.035626 | 0.998908 | 0.805472 | |
| 135 | 1 | j | -0.633972 | -0.644208 | 0.980286 | 0.276535 | |
| 135 | 1 | m | -0.796876 | -0.800037 | 0.999717 | 0.870626 | |
| 135 | 1 | n | -0.842132 | -0.811056 | 0.995354 | -1.830233 | |
| 135 | 2 | a | -0.637630 | -0.648359 | 0.999258 | 1.390371 | |
| 135 | 2 | b | -0.647093 | -0.652380 | 0.999766 | 1.247222 | |
| 135 | 2 | c | -0.635240 | -0.644584 | 0.999466 | 1.418114 | |
| 135 | 2 | d | -0.818316 | -0.819090 | 0.999769 | 0.257540 | |
| 135 | 2 | e | -0.001234 | -0.001234 | 1.000000 | 0.000000 | |
| 135 | 2 | f | -0.818960 | -0.818917 | 0.999319 | -0.024199 | |
| 135 | 2 | g | -0.816188 | -0.817158 | 0.999824 | 0.366650 | |
| 135 | 2 | h | -0.001788 | -0.002120 | 0.999999 | 1.315987 | |
| 135 | 2 | j | -0.766710 | -0.778185 | 0.995625 | 0.772382 | |
| 135 | 2 | l | -0.001329 | -0.001392 | 1.000000 | 0.479305 | |
| 135 | 2 | m | -0.813643 | -0.816586 | 0.999667 | 0.782069 | |
| 135 | 2 | n | -0.826860 | -0.797568 | 0.995694 | -1.778553 | |

NOTES:

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### ADVERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 142 | 1 | a | -0.192139 | -0.189532 | 0.999963 | -1.337336 | |
| 142 | 1 | d | -0.255597 | -0.266719 | 0.998654 | 0.963072 | |
| 142 | 1 | e | -0.000662 | -0.000662 | 1.000000 | 0.000000 | |
| 142 | 1 | h | -0.277455 | -0.209742 | 0.780646 | -0.461410 | |
| 142 | 1 | j | -0.318605 | -0.299714 | 0.819027 | -0.144612 | |
| 142 | 1 | m | -0.304107 | -0.254072 | 0.949614 | -0.714693 | |
| 142 | 1 | n | -0.211922 | -0.123314 | 0.936468 | -1.099862 | |
| 142 | 2 | a | -0.324310 | -0.321402 | 0.999345 | -1.265263 | |
| 142 | 2 | b | -0.435620 | -0.434607 | 0.999992 | -1.209647 | |
| 142 | 2 | c | -0.355980 | -0.353568 | 0.999961 | -1.251661 | |
| 142 | 2 | d | -0.339456 | -0.339884 | 0.999135 | 0.047741 | |
| 142 | 2 | e | -0.000662 | -0.000662 | 1.000000 | 0.000000 | |
| 142 | 2 | f | -0.452453 | -0.450467 | 0.998652 | -0.186777 | |
| 142 | 2 | g | -0.352275 | -0.351640 | 0.998953 | -0.064632 | |
| 142 | 2 | h | -0.277419 | -0.027069 | 0.120421 | -0.853365 | |
| 142 | 2 | j | -0.316247 | -0.338458 | 0.797386 | 0.161938 | |
| 142 | 2 | l | -0.255325 | -0.001435 | 0.395597 | -1.038994 | |
| 142 | 2 | m | -0.359307 | -0.322414 | 0.957514 | -0.586120 | |
| 142 | 2 | n | -0.254817 | -0.198763 | 0.942636 | -0.740485 | |

NOTES:

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## ADVERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 158 | 1 | a | 0.038318 | 0.037274 | 0.999861 | 0.234405 | |
| 158 | 1 | d | -0.162911 | -0.167314 | 0.999524 | 0.540739 | |
| 158 | 1 | e | -0.001032 | -0.001032 | 1.000000 | 0.000000 | |
| 158 | 1 | h | -0.261133 | -0.268266 | 0.999657 | 1.047817 | |
| 158 | 1 | j | -0.172847 | -0.186749 | 0.991273 | 0.400075 | |
| 158 | 1 | m | -0.212637 | -0.222111 | 0.999715 | 1.503621 | |
| 158 | 1 | n | -0.190370 | -0.209259 | 0.992913 | 0.605052 | |
| 158 | 2 | a | 0.090669 | 0.089328 | 0.999809 | 0.257478 | |
| 158 | 2 | b | 0.174475 | 0.173910 | 0.999972 | 0.285531 | |
| 158 | 2 | c | 0.116130 | 0.115103 | 0.999875 | 0.244216 | |
| 158 | 2 | d | -0.113967 | -0.125940 | 0.996291 | 0.523739 | |
| 158 | 2 | e | -0.001032 | -0.001032 | 1.000000 | 0.000000 | |
| 158 | 2 | f | 0.016314 | 0.000695 | 0.996384 | 0.687234 | |
| 158 | 2 | g | -0.089306 | -0.102465 | 0.996139 | 0.562771 | |
| 158 | 2 | h | -0.136551 | -0.174153 | 0.997518 | 2.001510 | (**** |
| 158 | 2 | j | -0.103790 | -0.124319 | 0.998090 | 1.248288 | |
| 158 | 2 | l | -0.007262 | -0.020129 | 0.999681 | 1.904769 | |
| 158 | 2 | m | -0.131206 | -0.146276 | 0.998073 | 0.915683 | |
| 158 | 2 | n | -0.120778 | -0.136574 | 0.996080 | 0.672644 | |

NOTES:

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### ADVERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 170 | 1 | a | -0.716613 | -0.716201 | 0.999987 | -0.500158 | |
| 170 | 1 | d | -0.731051 | -0.731320 | 0.999647 | 0.064753 | |
| 170 | 1 | e | -0.001109 | -0.001109 | 1.000000 | 0.000000 | |
| 170 | 1 | h | 0.166612 | 0.165329 | 0.999969 | 0.722759 | |
| 170 | 1 | j | -0.594562 | -0.595450 | 0.998884 | 0.101955 | |
| 170 | 1 | m | -0.636259 | -0.635176 | 0.999509 | -0.195144 | |
| 170 | 1 | n | -0.515708 | -0.512295 | 0.999210 | -0.434523 | |
| 170 | 2 | a | -0.678385 | -0.678112 | 0.999979 | -0.249519 | |
| 170 | 2 | b | -0.637558 | -0.637414 | 0.999996 | -0.274505 | |
| 170 | 2 | c | -0.678090 | -0.677830 | 0.999983 | -0.262757 | |
| 170 | 2 | d | -0.691708 | -0.693355 | 0.999701 | 0.404417 | |
| 170 | 2 | e | -0.001109 | -0.001109 | 1.000000 | 0.000000 | |
| 170 | 2 | f | -0.696939 | -0.697367 | 0.999905 | 0.188628 | |
| 170 | 2 | g | -0.689511 | -0.691282 | 0.999758 | 0.480403 | |
| 170 | 2 | h | 0.153761 | 0.153635 | 0.999985 | 0.102754 | |
| 170 | 2 | j | -0.553947 | -0.552176 | 0.999329 | -0.252509 | |
| 170 | 2 | l | 0.045678 | 0.046002 | 0.999997 | -0.622328 | |
| 170 | 2 | m | -0.623943 | -0.624003 | 0.999621 | 0.011997 | |
| 170 | 2 | n | -0.533728 | -0.532179 | 0.999460 | -0.242681 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

Page

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## ADVERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 180 | 1 | a | -0.297536 | -0.299409 | 0.999723 | 0.416233 | n |
| 180 | 1 | d | -0.475084 | -0.485908 | 0.999376 | 1.677805 | |
| 180 | 1 | e | -0.484654 | -0.484654 | 1.000000 | 0.000000 | |
| 180 | 1 | h | -0.234297 | -0.250428 | 0.998063 | 1.327498 | |
| 180 | 1 | j | -0.395090 | -0.398504 | 0.998871 | 0.390883 | |
| 180 | 1 | m | -0.473372 | -0.482114 | 0.999679 | 1.868891 | |
| 180 | 1 | n | -0.428501 | -0.432483 | 0.999846 | 1.235124 | |
| 180 | 2 | a | -0.219548 | -0.222590 | 0.999568 | 0.530523 | |
| 180 | 2 | b | -0.157462 | -0.159036 | 0.999904 | 0.573887 | |
| 180 | 2 | c | -0.213261 | -0.215989 | 0.999684 | 0.554789 | |
| 180 | 2 | d | -0.475058 | -0.487901 | 0.999342 | 1.914103 | |
| 180 | 2 | e | -0.434632 | -0.434632 | 1.000000 | 0.000000 | |
| 180 | 2 | f | -0.393963 | -0.404198 | 0.999606 | 1.916450 | |
| 180 | 2 | g | -0.468597 | -0.481172 | 0.999380 | 1.925501 | |
| 180 | 2 | h | -0.352302 | -0.377404 | 0.991004 | 0.997600 | |
| 180 | 2 | j | -0.449142 | -0.454957 | 0.999533 | 1.051901 | |
| 180 | 2 | l | -0.126480 | -0.138984 | 0.999041 | 1.437095 | |
| 180 | 2 | m | -0.476596 | -0.486384 | 0.999647 | 1.983032 | <**** |
| 180 | 2 | n | -0.445123 | -0.450480 | 0.999766 | 1.353539 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### ADVERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 182 | 1 | a | -0.194413 | -0.192936 | 0.999984 | -1.386175 | |
| 182 | 1 | d | -0.221779 | -0.224193 | 0.996365 | 0.153693 | |
| 182 | 1 | e | -0.000462 | -0.000462 | 1.000000 | 0.000000 | |
| 182 | 1 | h | 0.185728 | 0.185081 | 0.999996 | 1.301022 | |
| 182 | 1 | j | -0.008062 | -0.005805 | 0.998273 | -0.203242 | |
| 182 | 1 | m | -0.187365 | -0.184546 | 0.996166 | -0.173346 | |
| 182 | 1 | n | -0.166005 | -0.166631 | 0.997851 | 0.051283 | |
| 182 | 2 | a | -0.174304 | -0.172579 | 0.999979 | -1.414123 | |
| 182 | 2 | b | -0.101067 | -0.100631 | 0.999999 | -1.424118 | |
| 182 | 2 | c | -0.137425 | -0.136297 | 0.999991 | -1.417226 | |
| 182 | 2 | d | -0.223362 | -0.221232 | 0.994130 | -0.106675 | |
| 182 | 2 | e | -0.037327 | -0.037327 | 1.000000 | 0.000000 | |
| 182 | 2 | f | -0.147249 | -0.147663 | 0.998098 | 0.035948 | |
| 182 | 2 | g | -0.195747 | -0.194440 | 0.995430 | -0.073752 | |
| 182 | 2 | h | 0.188673 | 0.185455 | 0.999907 | 1.267652 | |
| 182 | 2 | j | -0.009834 | -0.016492 | 0.997645 | 0.513395 | |
| 182 | 2 | l | 0.157129 | 0.155712 | 0.999978 | 1.131076 | |
| 182 | 2 | m | -0.198272 | -0.196727 | 0.995693 | -0.089856 | |
| 182 | 2 | n | -0.190478 | -0.193120 | 0.998452 | 0.256058 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### ADVERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 184 | 1 | a | -0.132394 | -0.132581 | 0.999986 | 0.160857 | |
| 184 | 1 | d | 0.129099 | 0.129016 | 0.999984 | 0.065318 | |
| 184 | 1 | e | 0.064221 | 0.063340 | 0.999987 | 0.768379 | |
| 184 | 1 | h | -0.045491 | -0.045483 | 0.999958 | -0.003716 | |
| 184 | 1 | j | 0.003093 | 0.006338 | 0.999797 | -0.719477 | |
| 184 | 1 | m | 0.080914 | 0.081955 | 0.999973 | -0.636850 | |
| 184 | 1 | n | -0.007330 | -0.003280 | 0.999852 | -1.053561 | |
| 184 | 2 | a | -0.148937 | -0.149158 | 0.999987 | 0.195327 | |
| 184 | 2 | b | -0.139155 | -0.139231 | 0.999998 | 0.166794 | |
| 184 | 2 | c | -0.145872 | -0.146048 | 0.999990 | 0.173707 | |
| 184 | 2 | d | 0.128770 | 0.128531 | 0.999986 | 0.206309 | |
| 184 | 2 | e | 0.142193 | 0.140136 | 0.999926 | 0.764816 | |
| 184 | 2 | f | 0.039625 | 0.039450 | 0.999998 | 0.373604 | |
| 184 | 2 | g | 0.121064 | 0.120839 | 0.999989 | 0.215494 | |
| 184 | 2 | h | -0.032087 | -0.033915 | 0.999308 | 0.219789 | |
| 184 | 2 | j | 0.038815 | 0.039314 | 0.999870 | -0.138526 | |
| 184 | 2 | l | -0.004347 | -0.004624 | 0.999980 | 0.195383 | |
| 184 | 2 | m | 0.076227 | 0.076291 | 0.999966 | -0.035013 | |
| 184 | 2 | n | -0.024803 | -0.023447 | 0.999956 | -0.645791 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## DEFINITE ARTICLE

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 101 | 1 | a | -0.424357 | -0.422512 | 0.999964 | -1.198307 | |
| 101 | 1 | d | -0.745425 | -0.735126 | 0.978804 | -0.380127 | |
| 101 | 1 | e | -0.338200 | -0.354227 | 0.997701 | 1.270456 | |
| 101 | 1 | h | -0.084690 | -0.078579 | 0.998527 | -0.575966 | |
| 101 | 1 | j | -0.605974 | -0.526366 | 0.947036 | -1.465905 | |
| 101 | 1 | m | -0.742554 | -0.717269 | 0.972555 | -0.795915 | |
| 101 | 1 | n | -0.692001 | -0.659707 | 0.968759 | -0.881743 | |
| 101 | 2 | a | -0.381796 | -0.379436 | 0.999941 | -1.188190 | |
| 101 | 2 | b | -0.328840 | -0.327643 | 0.999988 | -1.289199 | |
| 101 | 2 | c | -0.381283 | -0.379214 | 0.999955 | -1.185281 | |
| 101 | 2 | d | -0.701048 | -0.682226 | 0.981310 | -0.681521 | |
| 101 | 2 | e | -0.339941 | -0.363183 | 0.995688 | 1.345865 | |
| 101 | 2 | f | -0.662621 | -0.658407 | 0.974987 | -0.128532 | |
| 101 | 2 | g | -0.701503 | -0.683738 | 0.980016 | -0.624398 | |
| 101 | 2 | h | -0.031633 | -0.030426 | 0.999290 | -0.163398 | |
| 101 | 2 | j | -0.712239 | -0.660565 | 0.978850 | -1.638745 | |
| 101 | 2 | l | -0.001532 | -0.001474 | 0.999999 | -0.185714 | |
| 101 | 2 | m | -0.731639 | -0.696171 | 0.981391 | -1.280029 | |
| 101 | 2 | n | -0.741866 | -0.686338 | 0.983399 | -1.964468 | <**** |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## DEFINITE ARTICLE

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 103 | 1 | a | 0.146284 | 0.151090 | 0.999577 | -0.817224 | |
| 103 | 1 | d | -0.053992 | 0.061290 | 0.960561 | -2.020354 | <**** |
| 103 | 1 | e | -0.000528 | -0.000528 | 1.000000 | 0.000000 | |
| 103 | 1 | h | -0.319705 | -0.331746 | 0.987033 | 0.387223 | |
| 103 | 1 | j | -0.316556 | -0.265306 | 0.961034 | -0.937486 | |
| 103 | 1 | m | -0.333513 | -0.194244 | 0.941728 | -2.050390 | <**** |
| 103 | 1 | n | -0.327129 | -0.207268 | 0.959997 | -2.123687 | <**** |
| 103 | 2 | a | 0.257744 | 0.261709 | 0.999437 | -0.598744 | |
| 103 | 2 | b | 0.295230 | 0.297466 | 0.999797 | -0.567829 | |
| 103 | 2 | c | 0.256569 | 0.260124 | 0.999546 | -0.597584 | |
| 103 | 2 | d | -0.003726 | 0.079665 | 0.973030 | -1.764196 | |
| 103 | 2 | e | -0.000528 | -0.000528 | 1.000000 | 0.000000 | |
| 103 | 2 | f | 0.032856 | 0.083885 | 0.979525 | -1.238270 | |
| 103 | 2 | g | -0.008358 | 0.072788 | 0.971869 | -1.680514 | |
| 103 | 2 | h | -0.314465 | -0.327134 | 0.994500 | 0.623337 | |
| 103 | 2 | j | -0.350808 | -0.309699 | 0.980181 | -1.064740 | |
| 103 | 2 | i | -0.249678 | -0.247160 | 0.998752 | -0.254841 | |
| 103 | 2 | m | -0.213815 | -0.119610 | 0.965732 | -1.784229 | |
| 103 | 2 | h | -0.242461 | -0.158955 | 0.972920 | -1.785058 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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# A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## DEFINITE ARTICLE

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 104 | 1 | a | -0.071262 | -0.071204 | 0.999904 | -0.018778 | |
| 104 | 1 | d | -0.623340 | -0.547688 | 0.940749 | -1.181029 | |
| 104 | 1 | e | -0.429965 | -0.402867 | 0.980538 | -0.672547 | |
| 104 | 1 | h | -0.347650 | -0.383169 | 0.987289 | 1.059273 | |
| 104 | 1 | j | -0.470712 | -0.324632 | 0.943542 | -2.035548 | (**** |
| 104 | 1 | m | -0.602159 | -0.523198 | 0.955703 | -1.380366 | |
| 104 | 1 | n | -0.415472 | -0.325862 | 0.966071 | -1.618661 | |
| 104 | 2 | a | -0.153981 | -0.154278 | 0.999859 | 0.080141 | |
| 104 | 2 | b | -0.161980 | -0.162270 | 0.999969 | 0.165467 | |
| 104 | 2 | c | -0.149594 | -0.149793 | 0.999884 | 0.059193 | |
| 104 | 2 | d | -0.592005 | -0.479979 | 0.948125 | -1.738371 | |
| 104 | 2 | e | -0.426036 | -0.372460 | 0.960155 | -0.919225 | |
| 104 | 2 | f | -0.577165 | -0.439319 | 0.938613 | -1.919253 | |
| 104 | 2 | g | -0.595353 | -0.475510 | 0.943964 | -1.784031 | |
| 104 | 2 | h | -0.178700 | -0.217979 | 0.990862 | 1.319833 | |
| 104 | 2 | j | -0.472299 | -0.317582 | 0.954676 | -2.360547 | (**** |
| 104 | 2 | l | -0.017455 | -0.023259 | 0.999859 | 1.545265 | |
| 104 | 2 | m | -0.565612 | -0.443978 | 0.956310 | -1.985878 | (**** |
| 104 | 2 | n | -0.384919 | -0.261436 | 0.968198 | -2.236528 | (**** |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## DEFINITE ARTICLE

|  |  |  | Correlation Coefficients |  |  | Significance Level |  |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 107 | 1 | a | -0.269170 | -0.269170 | 1.000000 | 0.000000 |  |
| 107 | 1 | d | -0.361714 | -0.435007 | 0.964493 | 1.215473 |  |
| 107 | 1 | e | -0.001095 | -0.001095 | 1.000000 | 0.000000 |  |
| 107 | 1 | h | 0.152533 | 0.168742 | 0.933024 | -0.185090 |  |
| 107 | 1 | j | -0.185056 | -0.254454 | 0.975135 | 1.308438 |  |
| 107 | 1 | m | -0.327307 | -0.424017 | 0.929626 | 1.136070 |  |
| 107 | 1 | n | -0.283932 | -0.416889 | 0.902309 | 1.313209 |  |
| 107 | 2 | a | -0.290729 | -0.290729 | 1.000000 | 0.000000 |  |
| 107 | 2 | b | -0.285007 | -0.285007 | 1.000000 | 0.000000 |  |
| 107 | 2 | c | -0.292260 | -0.292260 | 1.000000 | 0.000000 |  |
| 107 | 2 | d | -0.356617 | -0.448451 | 0.969943 | 1.629910 |  |
| 107 | 2 | e | -0.001095 | -0.001095 | 1.000000 | 0.000000 |  |
| 107 | 2 | f | -0.357481 | -0.450159 | 0.975357 | 1.800262 |  |
| 107 | 2 | g | -0.356079 | -0.450427 | 0.970253 | 1.679596 |  |
| 107 | 2 | h | 0.182394 | 0.209065 | 0.952498 | -0.363918 |  |
| 107 | 2 | j | -0.089937 | -0.184122 | 0.984029 | 2.183024 | (**** |
| 107 | 2 | l | 0.074758 | 0.075260 | 0.995797 | -0.022643 |  |
| 107 | 2 | m | -0.315778 | -0.430255 | 0.961571 | 1.774877 |  |
| 107 | 2 | n | -0.296199 | -0.411616 | 0.968664 | 1.957071 |  |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### DEFINITE ARTICLE

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 109 | 1 | a | -0.220519 | -0.220519 | 1.000000 | 0.000000 | |
| 109 | 1 | d | -0.360544 | -0.394514 | 0.987746 | 1.248560 | |
| 109 | 1 | e | -0.000545 | -0.000545 | 1.000000 | 0.000000 | |
| 109 | 1 | h | -0.066046 | -0.066349 | 0.999959 | 0.181646 | |
| 109 | 1 | j | -0.131462 | -0.118022 | 0.996936 | -0.931230 | |
| 109 | 1 | m | -0.328732 | -0.349701 | 0.988668 | 0.734758 | |
| 109 | 1 | n | -0.358384 | -0.377749 | 0.984920 | 0.644409 | |
| 109 | 2 | a | -0.228134 | -0.228134 | 1.000000 | 0.000000 | |
| 109 | 2 | b | -0.233510 | -0.233510 | 1.000000 | 0.000000 | |
| 109 | 2 | c | -0.234593 | -0.234593 | 1.000000 | 0.000000 | |
| 109 | 2 | d | -0.285177 | -0.305835 | 0.987646 | 0.739346 | |
| 109 | 2 | e | -0.000545 | -0.000545 | 1.000000 | 0.000000 | |
| 109 | 2 | f | -0.293837 | -0.305177 | 0.988468 | 0.421241 | |
| 109 | 2 | g | -0.289566 | -0.307594 | 0.987425 | 0.640507 | |
| 109 | 2 | h | -0.068850 | -0.068934 | 0.999958 | 0.049112 | |
| 109 | 2 | j | -0.125951 | -0.126579 | 0.998624 | 0.064933 | |
| 109 | 2 | l | -0.069214 | -0.070141 | 0.998880 | 0.105703 | |
| 109 | 2 | m | -0.296651 | -0.307070 | 0.987574 | 0.373192 | |
| 109 | 2 | n | -0.330370 | -0.336207 | 0.984358 | 0.188531 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### DEFINITE ARTICLE

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 135 | 1 | a | -0.590694 | -0.600528 | 0.999565 | 1.573369 | |
| 135 | 1 | d | -0.797236 | -0.802837 | 0.992671 | 0.317165 | |
| 135 | 1 | e | -0.001234 | -0.001234 | 1.000000 | 0.000000 | |
| 135 | 1 | h | -0.026503 | -0.054399 | 0.997769 | 1.723191 | |
| 135 | 1 | j | -0.633972 | -0.667409 | 0.958150 | 0.623624 | |
| 135 | 1 | m | -0.796876 | -0.807115 | 0.989432 | 0.482032 | |
| 135 | 1 | n | -0.842132 | -0.819953 | 0.987478 | -0.983305 | |
| 135 | 2 | a | -0.637630 | -0.648033 | 0.999177 | 1.293648 | |
| 135 | 2 | b | -0.647093 | -0.652253 | 0.999750 | 1.184265 | |
| 135 | 2 | c | -0.635240 | -0.644278 | 0.999399 | 1.309125 | |
| 135 | 2 | d | -0.818316 | -0.832591 | 0.991892 | 0.791085 | |
| 135 | 2 | e | -0.001234 | -0.001234 | 1.000000 | 0.000000 | |
| 135 | 2 | f | -0.818960 | -0.832482 | 0.989473 | 0.666627 | |
| 135 | 2 | g | -0.816188 | -0.830510 | 0.990344 | 0.750372 | |
| 135 | 2 | h | -0.001788 | -0.002325 | 0.999999 | 1.582846 | |
| 135 | 2 | j | -0.766710 | -0.789706 | 0.977474 | 0.698317 | |
| 135 | 2 | l | -0.001329 | -0.001392 | 1.000000 | 0.479305 | |
| 135 | 2 | m | -0.813643 | -0.831974 | 0.988363 | 0.859379 | |
| 135 | 2 | n | -0.826860 | -0.824281 | 0.988871 | -0.126364 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## DEFINITE ARTICLE

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 142 | 1 | a | -0.192139 | -0.189532 | 0.999963 | -1.337336 | |
| 142 | 1 | d | -0.255597 | -0.288940 | 0.940953 | 0.439755 | |
| 142 | 1 | e | -0.000662 | -0.000662 | 1.000000 | 0.000000 | |
| 142 | 1 | h | -0.277455 | -0.249826 | 0.914362 | -0.302090 | |
| 142 | 1 | j | -0.318605 | -0.312101 | 0.862602 | -0.057208 | |
| 142 | 1 | m | -0.304107 | -0.303750 | 0.940922 | -0.004756 | |
| 142 | 1 | n | -0.211922 | -0.206682 | 0.972119 | -0.098946 | |
| 142 | 2 | a | -0.324310 | -0.321402 | 0.999945 | -1.265263 | |
| 142 | 2 | b | -0.435620 | -0.434607 | 0.999992 | -1.209647 | |
| 142 | 2 | c | -0.355980 | -0.353568 | 0.999961 | -1.25:661 | |
| 142 | 2 | d | -0.339456 | -0.351042 | 0.962410 | 0.196452 | |
| 142 | 2 | e | -0.000662 | -0.000662 | 1.000000 | 0.000000 | |
| 142 | 2 | f | -0.452453 | -0.438539 | 0.964745 | -0.255435 | |
| 142 | 2 | g | -0.352275 | -0.357367 | 0.961688 | 0.085868 | |
| 142 | 2 | h | -0.277419 | -0.054442 | 0.217178 | -0.804482 | |
| 142 | 2 | j | -0.316247 | -0.360107 | 0.848330 | 0.370505 | |
| 142 | 2 | l | -0.255325 | -0.002208 | 0.398154 | -1.037952 | |
| 142 | 2 | m | -0.359307 | -0.356064 | 0.955944 | -0.051074 | |
| 142 | 2 | n | -0.254817 | -0.261328 | 0.978172 | 0.140630 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### DEFINITE ARTICLE

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 158 | 1 | a | 0.038318 | 0.037274 | 0.999861 | 0.234405 | |
| 158 | 1 | d | -0.162911 | -0.142162 | 0.977468 | -0.370037 | |
| 158 | 1 | e | -0.001032 | -0.001032 | 1.000000 | 0.000000 | |
| 158 | 1 | h | -0.261133 | -0.249736 | 0.993442 | -0.384794 | |
| 158 | 1 | j | -0.172847 | -0.138819 | 0.969187 | -0.519199 | |
| 158 | 1 | m | -0.212637 | -0.184153 | 0.975315 | -0.489168 | |
| 158 | 1 | n | -0.190370 | -0.171699 | 0.972976 | -0.305557 | |
| 158 | 2 | a | 0.090669 | 0.089328 | 0.999809 | 0.257478 | |
| 158 | 2 | b | 0.174475 | 0.173910 | 0.999972 | 0.285531 | |
| 158 | 2 | c | 0.116130 | 0.115103 | 0.999875 | 0.244216 | |
| 158 | 2 | d | -0.113967 | -0.096088 | 0.978496 | -0.324375 | |
| 158 | 2 | e | -0.001032 | -0.001032 | 1.000000 | 0.000000 | |
| 158 | 2 | f | 0.016314 | 0.025684 | 0.981859 | -0.184111 | |
| 158 | 2 | g | -0.089306 | -0.073014 | 0.977661 | -0.289364 | |
| 158 | 2 | h | -0.136551 | -0.141136 | 0.993226 | 0.148835 | |
| 158 | 2 | j | -0.103790 | -0.098236 | 0.987446 | -0.131824 | |
| 158 | 2 | l | -0.007262 | -0.010593 | 0.999166 | 0.305304 | |
| 158 | 2 | m | -0.131206 | -0.117746 | 0.983213 | -0.277017 | |
| 158 | 2 | n | -0.120778 | -0.118780 | 0.981990 | -0.039666 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## DEFINITE ARTICLE

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 170 | 1 | a | -0.716613 | -0.716201 | 0.999987 | -0.500158 | |
| 170 | 1 | d | -0.731051 | -0.740470 | 0.993749 | 0.536490 | |
| 170 | 1 | e | -0.001109 | -0.001109 | 1.000000 | 0.000000 | |
| 170 | 1 | h | 0.166612 | 0.161113 | 0.999923 | 1.938776 | |
| 170 | 1 | j | -0.594562 | -0.634013 | 0.987689 | 1.318577 | |
| 170 | 1 | m | -0.636259 | -0.653973 | 0.992768 | 0.822547 | |
| 170 | 1 | n | -0.515708 | -0.550422 | 0.992263 | 1.377149 | |
| 170 | 2 | a | -0.678385 | -0.678112 | 0.999979 | -0.249519 | |
| 170 | 2 | b | -0.637558 | -0.637414 | 0.999996 | -0.274505 | |
| 170 | 2 | c | -0.678090 | -0.677830 | 0.999983 | -0.262757 | |
| 170 | 2 | d | -0.691708 | -0.716829 | 0.995616 | 1.497848 | |
| 170 | 2 | e | -0.001109 | -0.001109 | 1.000000 | 0.000000 | |
| 170 | 2 | f | -0.696939 | -0.729204 | 0.995410 | 1.803287 | |
| 170 | 2 | g | -0.689511 | -0.717631 | 0.995677 | 1.648823 | |
| 170 | 2 | h | 0.153761 | 0.148671 | 0.999951 | 2.235455 | <**** |
| 170 | 2 | j | -0.553947 | -0.594241 | 0.994575 | 1.866306 | |
| 170 | 2 | l | 0.045678 | 0.044916 | 0.999997 | 1.372835 | |
| 170 | 2 | m | -0.623943 | -0.655047 | 0.995500 | 1.682713 | |
| 170 | 2 | n | -0.533728 | -0.577632 | 0.994568 | 1.987606 | <**** |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### DEFINITE ARTICLE

|  |  |  | Correlation Coefficients |  |  | Significance Level |  |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 180 | 1 | a | -0.297536 | -0.299409 | 0.999723 | 0.416233 |  |
| 180 | 1 | d | -0.475084 | -0.465962 | 0.972956 | -0.222534 |  |
| 180 | 1 | e | -0.484654 | -0.448249 | 0.943001 | -0.609328 |  |
| 180 | 1 | h | -0.234297 | -0.273204 | 0.994010 | 1.815255 |  |
| 180 | 1 | j | -0.395090 | -0.383178 | 0.972203 | -0.274375 |  |
| 180 | 1 | m | -0.473372 | -0.462677 | 0.970381 | -0.248950 |  |
| 180 | 1 | n | -0.428501 | -0.421864 | 0.971957 | -0.155029 |  |
| 180 | 2 | a | -0.219548 | -0.222590 | 0.999568 | 0.530523 |  |
| 180 | 2 | b | -0.157462 | -0.159036 | 0.999904 | 0.573887 |  |
| 180 | 2 | c | -0.213261 | -0.215989 | 0.999684 | 0.554789 |  |
| 180 | 2 | d | -0.475058 | -0.465784 | 0.965917 | -0.201648 |  |
| 180 | 2 | e | -0.434632 | -0.423526 | 0.925996 | -0.160429 |  |
| 180 | 2 | f | -0.393963 | -0.397721 | 0.966582 | 0.079270 |  |
| 180 | 2 | g | -0.468597 | -0.462149 | 0.965305 | -0.138573 |  |
| 180 | 2 | h | -0.352302 | -0.400961 | 0.981130 | 1.333672 |  |
| 180 | 2 | j | -0.449142 | -0.425860 | 0.976790 | -0.599360 |  |
| 180 | 2 | l | -0.126480 | -0.150684 | 0.997611 | 1.761979 |  |
| 180 | 2 | m | -0.476596 | -0.459917 | 0.969177 | -0.380275 |  |
| 180 | 2 | n | -0.445123 | -0.424273 | 0.974688 | -0.513802 |  |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

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Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## DEFINITE ARTICLE

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 182 | 1 | a | -0.194413 | -0.192936 | 0.999984 | -1.386175 | |
| 182 | 1 | d | -0.221779 | -0.187207 | 0.993105 | -1.583342 | |
| 182 | 1 | e | -0.000462 | -0.000462 | 1.000000 | 0.000000 | |
| 182 | 1 | h | 0.185728 | 0.201367 | 0.997233 | -1.131017 | |
| 182 | 1 | j | -0.008062 | 0.002560 | 0.992515 | -0.459382 | |
| 182 | 1 | m | -0.187365 | -0.154416 | 0.988405 | -1.160081 | |
| 182 | 1 | n | -0.166005 | -0.135654 | 0.982471 | -0.867261 | |
| 182 | 2 | a | -0.174304 | -0.172579 | 0.999979 | -1.414123 | |
| 182 | 2 | b | -0.101067 | -0.100631 | 0.999999 | -1.424118 | |
| 182 | 2 | c | -0.137425 | -0.136297 | 0.999991 | -1.417226 | |
| 182 | 2 | d | -0.223362 | -0.177736 | 0.991122 | -1.837508 | |
| 182 | 2 | e | -0.037327 | -0.037327 | 1.000000 | 0.000000 | |
| 182 | 2 | f | -0.147249 | -0.126453 | 0.993692 | -0.988232 | |
| 182 | 2 | g | -0.195747 | -0.158885 | 0.991635 | -1.527192 | |
| 182 | 2 | h | 0.188673 | 0.198303 | 0.999043 | -1.183623 | |
| 182 | 2 | j | -0.009834 | 0.012329 | 0.987399 | -0.738875 | |
| 182 | 2 | l | 0.157129 | 0.162794 | 0.999685 | -1.208232 | |
| 182 | 2 | m | -0.198272 | -0.152594 | 0.987349 | -1.538783 | |
| 182 | 2 | n | -0.190478 | -0.151898 | 0.984652 | -1.180870 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## DEFINITE ARTICLE

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 184 | 1 | a | -0.132394 | -0.132581 | 0.999986 | 0.160857 | |
| 184 | 1 | d | 0.129099 | 0.066967 | 0.964340 | 1.046246 | |
| 184 | 1 | e | 0.064221 | 0.004749 | 0.965202 | 1.010003 | |
| 184 | 1 | h | -0.045491 | -0.042961 | 0.999755 | -0.511292 | |
| 184 | 1 | j | 0.003093 | -0.010500 | 0.963262 | 0.224291 | |
| 184 | 1 | m | 0.080914 | 0.039387 | 0.962558 | 0.680278 | |
| 184 | 1 | n | -0.007330 | -0.045538 | 0.971267 | 0.713418 | |
| 184 | 2 | a | -0.148937 | -0.149158 | 0.999987 | 0.195327 | |
| 184 | 2 | b | -0.139155 | -0.139231 | 0.999998 | 0.166794 | |
| 184 | 2 | c | -0.145872 | -0.146048 | 0.999990 | 0.173707 | |
| 184 | 2 | d | 0.128770 | 0.054595 | 0.949794 | 1.052771 | |
| 184 | 2 | e | 0.142193 | 0.082934 | 0.958561 | 0.927009 | |
| 184 | 2 | f | 0.039625 | -0.025722 | 0.948904 | 0.915649 | |
| 184 | 2 | g | 0.121064 | 0.044100 | 0.947888 | 1.071616 | |
| 184 | 2 | h | -0.032087 | -0.032241 | 0.999998 | 0.322612 | |
| 184 | 2 | j | 0.038815 | -0.012448 | 0.957412 | 0.786357 | |
| 184 | 2 | l | -0.004347 | -0.004342 | 0.999999 | -0.017192 | |
| 184 | 2 | m | 0.076227 | 0.015787 | 0.952486 | 0.878859 | |
| 184 | 2 | n | -0.024803 | -0.069690 | 0.970039 | 0.821506 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## CENTRAL PRONOUNS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 203 | 1 | a | -0.105343 | -0.106148 | 0.999980 | 0.553864 | |
| 203 | 1 | d | -0.141626 | -0.146761 | 0.988414 | 0.148595 | |
| 203 | 1 | e | -0.001022 | -0.001022 | 1.000000 | 0.000000 | |
| 203 | 1 | h | 0.117064 | 0.119714 | 0.995724 | -0.125785 | |
| 203 | 1 | j | 0.072857 | 0.069456 | 0.988791 | 0.099277 | |
| 203 | 1 | m | -0.097276 | -0.103047 | 0.988140 | 0.164159 | |
| 203 | 1 | n | -0.012827 | -0.014390 | 0.994124 | 0.062847 | |
| 203 | 2 | a | -0.042574 | -0.043710 | 0.999964 | 0.582901 | |
| 203 | 2 | b | 0.005796 | 0.005370 | 0.999995 | 0.574551 | |
| 203 | 2 | c | -0.037613 | -0.038579 | 0.999974 | 0.585132 | |
| 203 | 2 | d | -0.070321 | -0.053172 | 0.986919 | -0.463065 | |
| 203 | 2 | e | -0.001022 | -0.001022 | 1.000000 | 0.000000 | |
| 203 | 2 | f | -0.036263 | -0.021549 | 0.991421 | -0.489875 | |
| 203 | 2 | g | -0.070989 | -0.053954 | 0.987333 | -0.467457 | |
| 203 | 2 | h | 0.069005 | 0.074765 | 0.998039 | -0.401902 | |
| 203 | 2 | j | 0.034705 | 0.046557 | 0.986288 | -0.312227 | |
| 203 | 2 | l | 0.002329 | 0.002661 | 0.999996 | -0.498452 | |
| 203 | 2 | m | -0.044468 | -0.029961 | 0.985690 | -0.374055 | |
| 203 | 2 | n | 0.004985 | 0.015115 | 0.992221 | -0.354036 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S; Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### CENTRAL PRONOUNS

| Q | S | TW | Correlation Coefficients<br>$r_{ju}$ | <br>$r_{jr}$ | <br>$r_{ur}$ | Significance Level<br>Z | <br>p > .05 |
|---|---|---|---|---|---|---|---|
| 207 | 1 | a | 0.089728 | 0.088733 | 0.999863 | 0.269908 | |
| 207 | 1 | d | -0.006064 | 0.008881 | 0.959878 | -0.235964 | |
| 207 | 1 | e | -0.000956 | -0.000956 | 1.000000 | 0.000000 | |
| 207 | 1 | h | 0.213822 | 0.204871 | 0.999818 | 2.116904 | <**** |
| 207 | 1 | j | 0.168212 | 0.150318 | 0.997112 | 1.064410 | |
| 207 | 1 | m | 0.099118 | 0.097251 | 0.980516 | 0.042517 | |
| 207 | 1 | n | 0.064855 | 0.072536 | 0.979105 | -0.168435 | |
| 207 | 2 | a | 0.069602 | 0.068528 | 0.999717 | 0.202447 | |
| 207 | 2 | b | 0.054739 | 0.054262 | 0.999936 | 0.188977 | |
| 207 | 2 | c | 0.070263 | 0.069245 | 0.999769 | 0.212202 | |
| 207 | 2 | d | 0.021932 | 0.053102 | 0.967664 | -0.548712 | |
| 207 | 2 | e | -0.000956 | -0.000956 | 1.000000 | 0.000000 | |
| 207 | 2 | f | -0.040281 | 0.031567 | 0.953723 | -1.058178 | |
| 207 | 2 | g | 0.018805 | 0.058703 | 0.966936 | -0.694770 | |
| 207 | 2 | h | 0.202720 | 0.194292 | 0.999825 | 2.029956 | <**** |
| 207 | 2 | j | 0.193024 | 0.189561 | 0.999021 | 0.356631 | |
| 207 | 2 | l | 0.175987 | 0.172265 | 0.999885 | 1.113286 | |
| 207 | 2 | m | 0.121846 | 0.138912 | 0.985794 | -0.456642 | |
| 207 | 2 | n | 0.098820 | 0.122376 | 0.984216 | -0.596537 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### CENTRAL PRONOUNS

|  |  |  | Correlation Coefficients |  |  | Significance Level |  |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 212 | 1 | a | -0.532393 | -0.534533 | 0.999965 | 1.423618 |  |
| 212 | 1 | d | -0.630979 | -0.642554 | 0.994251 | 0.678550 |  |
| 212 | 1 | e | -0.281644 | -0.387175 | 0.968010 | 2.111563 | <**** |
| 212 | 1 | h | 0.089775 | 0.084396 | 0.988412 | 0.173772 |  |
| 212 | 1 | j | -0.592539 | -0.578060 | 0.978164 | -0.418296 |  |
| 212 | 1 | m | -0.663788 | -0.651190 | 0.994946 | -0.801316 |  |
| 212 | 1 | n | -0.701485 | -0.653017 | 0.988907 | -1.929199 |  |
| 212 | 2 | a | -0.553674 | -0.556193 | 0.999956 | 1.510422 |  |
| 212 | 2 | b | -0.536118 | -0.537247 | 0.999930 | 1.407011 |  |
| 212 | 2 | c | -0.560078 | -0.562278 | 0.999967 | 1.525915 |  |
| 212 | 2 | d | -0.683127 | -0.628426 | 0.947118 | -1.070159 |  |
| 212 | 2 | e | -0.288411 | -0.387069 | 0.975143 | 2.230195 | <**** |
| 212 | 2 | f | -0.681729 | -0.602285 | 0.937197 | -1.380304 |  |
| 212 | 2 | g | -0.692679 | -0.630822 | 0.943921 | -1.176219 |  |
| 212 | 2 | h | 0.055268 | 0.047928 | 0.991705 | 0.273549 |  |
| 212 | 2 | j | -0.685346 | -0.606738 | 0.942597 | -1.427929 |  |
| 212 | 2 | l | 0.004343 | 0.003638 | 0.999915 | 0.264216 |  |
| 212 | 2 | m | -0.710908 | -0.637601 | 0.941238 | -1.363291 |  |
| 212 | 2 | n | -0.731150 | -0.632344 | 0.935889 | -1.717563 |  |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### CENTRAL PRONOUNS

|  |  |  | Correlation Coefficients |  |  | Significance Level |  |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 219 | 1 | a | -0.331415 | -0.331415 | 1.000000 | 0.000000 |  |
| 219 | 1 | d | -0.431196 | -0.461884 | 0.984751 | 0.777714 |  |
| 219 | 1 | e | -0.001101 | -0.001101 | 1.000000 | 0.000000 |  |
| 219 | 1 | h | -0.738016 | -0.743589 | 0.972328 | 0.142141 |  |
| 219 | 1 | j | -0.671656 | -0.711695 | 0.982453 | 1.120865 |  |
| 219 | 1 | m | -0.541866 | -0.580514 | 0.983723 | 1.006440 |  |
| 219 | 1 | n | -0.562968 | -0.600416 | 0.981076 | 0.923600 |  |
| 219 | 2 | a | -0.253123 | -0.253123 | 1.000000 | 0.000000 |  |
| 219 | 2 | b | -0.223322 | -0.223322 | 1.000000 | 0.000000 |  |
| 219 | 2 | c | -0.264359 | -0.264359 | 1.000000 | 0.000000 |  |
| 219 | 2 | d | -0.395491 | -0.427720 | 0.981014 | 0.720933 |  |
| 219 | 2 | e | -0.001101 | -0.001101 | 1.000000 | 0.000000 |  |
| 219 | 2 | f | -0.380616 | -0.413374 | 0.975909 | 0.647394 |  |
| 219 | 2 | g | -0.404803 | -0.437486 | 0.980249 | 0.720044 |  |
| 219 | 2 | h | -0.769917 | -0.747135 | 0.963845 | -0.519063 |  |
| 219 | 2 | j | -0.594641 | -0.640518 | 0.981724 | 1.164429 |  |
| 219 | 2 | l | -0.616435 | -0.650398 | 0.977838 | 0.816354 |  |
| 219 | 2 | m | -0.504693 | -0.549308 | 0.982342 | 1.085509 |  |
| 219 | 2 | n | -0.520418 | -0.562119 | 0.979712 | 0.962351 |  |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### CENTRAL PRONOUNS

|  |  |  | Correlation Coefficients |  |  | Significance Level |  |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 221 | 1 | a | 0.044923 | 0.044756 | 0.999961 | 0.271199 | - |
| 221 | 1 | d | 0.075409 | -0.091837 | 0.953991 | 2.082487 | (**** |
| 221 | 1 | e | -0.000885 | -0.000885 | 1.000000 | 0.000000 |  |
| 221 | 1 | h | -0.034912 | -0.037803 | 0.999912 | 0.814601 |  |
| 221 | 1 | j | -0.072548 | -0.179923 | 0.980257 | 2.031937 | (**** |
| 221 | 1 | m | 0.012463 | -0.140895 | 0.967212 | 2.257995 | (**** |
| 221 | 1 | n | -0.082838 | -0.191504 | 0.987330 | 2.554274 | (**** |
| 221 | 2 | a | 0.035569 | 0.035454 | 0.999933 | 0.037527 |  |
| 221 | 2 | b | 0.024068 | 0.023727 | 0.999973 | 0.173684 |  |
| 221 | 2 | c | 0.035314 | 0.035149 | 0.999942 | 0.057249 |  |
| 221 | 2 | d | 0.040988 | -0.090963 | 0.956845 | 1.690999 |  |
| 221 | 2 | e | -0.000885 | -0.000885 | 1.000000 | 0.000000 |  |
| 221 | 2 | f | -0.003799 | -0.088283 | 0.971130 | 1.319809 |  |
| 221 | 2 | g | 0.035177 | -0.091772 | 0.957515 | 1.639048 |  |
| 221 | 2 | h | -0.034210 | -0.036675 | 0.999963 | 1.076885 |  |
| 221 | 2 | j | -0.066140 | -0.147974 | 0.983964 | 1.717527 |  |
| 221 | 2 | l | -0.001531 | -0.001678 | 1.000000 | 1.399711 |  |
| 221 | 2 | m | -0.013498 | -0.114270 | 0.975392 | 1.707021 |  |
| 221 | 2 | n | -0.092854 | -0.156450 | 0.989795 | 1.673295 |  |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### CENTRAL PRONOUNS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 222 | 1 | a | -0.065303 | -0.065303 | 1.000000 | 0.000000 | |
| 222 | 1 | d | -0.407137 | -0.374690 | 0.948363 | -0.490593 | |
| 222 | 1 | e | -0.000884 | -0.000884 | 1.000000 | 0.000000 | |
| 222 | 1 | h | -0.182421 | -0.182934 | 0.999813 | 0.120842 | |
| 222 | 1 | j | -0.403934 | -0.376705 | 0.938304 | -0.377074 | |
| 222 | 1 | m | -0.430564 | -0.399497 | 0.942107 | -0.449155 | |
| 222 | 1 | n | -0.194080 | -0.160212 | 0.975691 | -0.697601 | |
| 222 | 2 | a | -0.076259 | -0.076259 | 1.000000 | 0.000000 | |
| 222 | 2 | b | -0.063133 | -0.063133 | 1.000000 | 0.000000 | |
| 222 | 2 | c | -0.073564 | -0.073564 | 1.000000 | 0.000000 | |
| 222 | 2 | d | -0.410846 | -0.391805 | 0.980736 | -0.472869 | |
| 222 | 2 | e | -0.000884 | -0.000884 | 1.000000 | 0.000000 | |
| 222 | 2 | f | -0.338840 | -0.336722 | 0.994392 | -0.095047 | |
| 222 | 2 | g | -0.410581 | -0.393432 | 0.987102 | -0.520166 | |
| 222 | 2 | h | -0.022308 | -0.021811 | 0.999995 | -0.702709 | |
| 222 | 2 | j | -0.430670 | -0.407286 | 0.972594 | -0.491216 | |
| 222 | 2 | l | -0.002454 | -0.002434 | 1.000000 | -0.223601 | |
| 222 | 2 | m | -0.442443 | -0.421587 | 0.979479 | -0.509322 | |
| 222 | 2 | n | -0.256865 | -0.223773 | 0.984624 | -0.867158 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## CENTRAL PRONOUNS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 223 | 1 | a | -0.732594 | -0.732594 | 1.000000 | 0.000000 | |
| 223 | 1 | d | -0.694873 | -0.677763 | 0.997143 | -1.092917 | |
| 223 | 1 | e | -0.000648 | -0.000648 | 1.000000 | 0.000000 | |
| 223 | 1 | h | -0.373036 | -0.373031 | 1.000000 | -0.138144 | |
| 223 | 1 | j | -0.422509 | -0.420913 | 0.999851 | -0.380351 | |
| 223 | 1 | m | -0.695676 | -0.686277 | 0.997616 | -0.687806 | |
| 223 | 1 | n | -0.639829 | -0.629727 | 0.997056 | -0.626973 | |
| 223 | 2 | a | -0.754136 | -0.754136 | 1.000000 | 0.000000 | |
| 223 | 2 | b | -0.718551 | -0.718551 | 1.000000 | 0.000000 | |
| 223 | 2 | c | -0.752835 | -0.752835 | 1.000000 | 0.000000 | |
| 223 | 2 | d | -0.732325 | -0.707707 | 0.986766 | -0.790231 | |
| 223 | 2 | e | -0.000648 | -0.000648 | 1.000000 | 0.000000 | |
| 223 | 2 | f | -0.709220 | -0.699728 | 0.971249 | -0.209693 | |
| 223 | 2 | g | -0.731842 | -0.706009 | 0.983403 | -0.743238 | |
| 223 | 2 | h | -0.361158 | -0.361037 | 1.000000 | -0.982439 | |
| 223 | 2 | j | -0.389875 | -0.391240 | 0.999863 | 0.334508 | |
| 223 | 2 | l | -0.315803 | -0.315725 | 1.000000 | -1.159576 | |
| 223 | 2 | m | -0.726692 | -0.732142 | 0.988856 | 0.199866 | |
| 223 | 2 | n | -0.670259 | -0.678302 | 0.989974 | 0.287234 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### CENTRAL PRONOUNS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 227 | 1 | a | -0.128573 | -0.128573 | 1.000000 | 0.000000 | |
| 227 | 1 | d | -0.321199 | -0.366376 | 0.951639 | 0.690588 | |
| 227 | 1 | e | -0.000658 | -0.000658 | 1.000000 | 0.000000 | |
| 227 | 1 | h | 0.333390 | 0.338388 | 0.990355 | -0.170894 | |
| 227 | 1 | j | 0.059223 | -0.078257 | 0.942847 | 1.830749 | |
| 227 | 1 | m | -0.227812 | -0.318183 | 0.947080 | 1.284844 | |
| 227 | 1 | n | -0.061523 | -0.200120 | 0.913762 | 1.512095 | |
| 227 | 2 | a | -0.122705 | -0.122705 | 1.000000 | 0.000000 | |
| 227 | 2 | b | -0.133699 | -0.133699 | 1.000000 | 0.000000 | |
| 227 | 2 | c | -0.126353 | -0.126353 | 1.000000 | 0.000000 | |
| 227 | 2 | d | -0.288205 | -0.300352 | 0.955781 | 0.191304 | |
| 227 | 2 | e | -0.000658 | -0.000658 | 1.000000 | 0.000000 | |
| 227 | 2 | f | -0.282278 | -0.301705 | 0.952469 | 0.294832 | |
| 227 | 2 | g | -0.290104 | -0.302799 | 0.952048 | 0.192151 | |
| 227 | 2 | h | 0.331148 | 0.335086 | 0.998555 | -0.347107 | |
| 227 | 2 | j | 0.023736 | -0.053345 | 0.976768 | 1.602716 | |
| 227 | 2 | l | 0.037912 | 0.085841 | 0.989605 | -1.489756 | |
| 227 | 2 | m | -0.214012 | -0.252270 | 0.966465 | 0.678814 | |
| 227 | 2 | .n | -0.066552 | -0.146941 | 0.962811 | 1.327089 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### CENTRAL PRONOUNS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 230 | 1 | a | -0.373570 | -0.373570 | 1.000000 | 0.000000 | |
| 230 | 1 | d | -0.251948 | -0.230046 | 0.986592 | -0.599926 | |
| 230 | 1 | e | -0.000600 | -0.000600 | 1.000000 | 0.000000 | |
| 230 | 1 | h | 0.076769 | 0.078429 | 0.999973 | -0.981999 | |
| 230 | 1 | j | 0.058008 | 0.063166 | 0.998266 | -0.382513 | |
| 230 | 1 | m | -0.102239 | -0.079651 | 0.968921 | -0.396626 | |
| 230 | 1 | n | -0.169797 | -0.126726 | 0.970358 | -0.779544 | |
| 230 | 2 | a | -0.305620 | -0.305620 | 1.000000 | 0.000000 | |
| 230 | 2 | b | -0.234657 | -0.234657 | 1.000000 | 0.000000 | |
| 230 | 2 | c | -0.301274 | -0.301274 | 1.000000 | 0.000000 | |
| 230 | 2 | d | -0.197532 | -0.192806 | 0.998371 | -0.367888 | |
| 230 | 2 | e | -0.000600 | -0.000600 | 1.000000 | 0.000000 | |
| 230 | 2 | f | -0.149564 | -0.148999 | 0.999690 | -0.099939 | |
| 230 | 2 | g | -0.196159 | -0.191492 | 0.998626 | -0.395459 | |
| 230 | 2 | h | 0.064555 | 0.065137 | 0.999985 | -0.465699 | |
| 230 | 2 | j | 0.074391 | 0.072703 | 0.999321 | 0.200236 | |
| 230 | 2 | l | 0.073664 | 0.074166 | 0.999994 | -0.609238 | |
| 230 | 2 | m | -0.075132 | -0.070767 | 0.996823 | -0.239286 | |
| 230 | 2 | n | -0.137167 | -0.125737 | 0.997244 | -0.676492 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### CENTRAL PRONOUNS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 235 | 1 | a | -0.031123 | -0.031123 | 1.000000 | 0.000000 | |
| 235 | 1 | d | -0.329375 | -0.389761 | 0.987240 | 1.669537 | |
| 235 | 1 | e | -0.000931 | -0.000931 | 1.000000 | 0.000000 | |
| 235 | 1 | h | -0.094045 | -0.132300 | 0.961816 | 0.591290 | |
| 235 | 1 | j | -0.506407 | -0.493855 | 0.990989 | -0.456492 | |
| 235 | 1 | m | -0.397157 | -0.449965 | 0.983291 | 1.320095 | |
| 235 | 1 | n | -0.457890 | -0.489346 | 0.984272 | 0.844257 | |
| 235 | 2 | a | -0.160684 | -0.160684 | 1.000000 | 0.000000 | |
| 235 | 2 | b | -0.226216 | -0.226216 | 1.000000 | 0.000000 | |
| 235 | 2 | c | -0.155708 | -0.155708 | 1.000000 | 0.000000 | |
| 235 | 2 | d | -0.361740 | -0.326042 | 0.988291 | -1.043553 | |
| 235 | 2 | e | -0.000931 | -0.000931 | 1.000000 | 0.000000 | |
| 235 | 2 | f | -0.412523 | -0.345244 | 0.976975 | -1.406890 | |
| 235 | 2 | g | -0.362648 | -0.319956 | 0.986514 | -1.159334 | |
| 235 | 2 | h | -0.126989 | -0.146510 | 0.991070 | 0.625347 | |
| 235 | 2 | j | -0.453489 | -0.412105 | 0.983240 | -1.047251 | |
| 235 | 2 | l | -0.014128 | -0.016507 | 0.999903 | 0.724916 | |
| 235 | 2 | m | -0.403257 | -0.357926 | 0.984402 | -1.160001 | |
| 235 | 2 | n | -0.434261 | -0.385742 | 0.982510 | -1.184994 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### CENTRAL PRONOUNS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 248 | 1 | a | -0.174181 | -0.171062 | 0.999898 | -0.990842 | |
| 248 | 1 | d | -0.376824 | -0.289763 | 0.912432 | -0.984547 | |
| 248 | 1 | e | -0.001000 | -0.001000 | 1.000000 | 0.000000 | |
| 248 | 1 | h | -0.209710 | -0.209637 | 1.000000 | -0.574103 | |
| 248 | 1 | j | -0.240205 | -0.226485 | 0.997492 | -0.888240 | |
| 248 | 1 | m | -0.384995 | -0.311930 | 0.952670 | -1.124287 | |
| 248 | 1 | n | -0.315971 | -0.261260 | 0.969052 | -1.022399 | |
| 248 | 2 | a | -0.162555 | -0.158754 | 0.999855 | -1.010935 | |
| 248 | 2 | b | -0.162328 | -0.160639 | 0.999969 | -0.978255 | |
| 248 | 2 | c | -0.165652 | -0.162231 | 0.999882 | -1.006056 | |
| 248 | 2 | d | -0.388644 | -0.290364 | 0.926808 | -1.213387 | |
| 248 | 2 | e | -0.001000 | -0.001000 | 1.000000 | 0.000000 | |
| 248 | 2 | f | -0.387811 | -0.297756 | 0.925675 | -1.106347 | |
| 248 | 2 | g | -0.385112 | -0.283832 | 0.923286 | -1.219670 | |
| 248 | 2 | h | -0.209574 | -0.209509 | 1.000000 | -0.816489 | |
| 248 | 2 | j | -0.253679 | -0.239191 | 0.997948 | -1.038575 | |
| 248 | 2 | l | -0.206419 | -0.206391 | 1.000000 | -0.350382 | |
| 248 | 2 | m | -0.426066 | -0.346399 | 0.953436 | -1.249369 | |
| 248 | 2 | n | -0.348954 | -0.287590 | 0.969677 | -1.166073 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### CENTRAL PRONOUNS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 252 | 1 | a | 0.087821 | 0.087821 | 1.000000 | 0.000000 | |
| 252 | 1 | d | 0.146321 | 0.139596 | 0.974837 | 0.128531 | |
| 252 | 1 | e | -0.000931 | -0.000931 | 1.000000 | 0.000000 | |
| 252 | 1 | h | 0.187661 | 0.201717 | 0.996858 | -0.765583 | |
| 252 | 1 | J | 0.209856 | 0.226758 | 0.972531 | -0.313510 | |
| 252 | 1 | m | 0.200105 | 0.199040 | 0.972810 | 0.019795 | |
| 252 | 1 | n | 0.253456 | 0.261383 | 0.975209 | -0.156356 | |
| 252 | 2 | a | 0.006594 | 0.006594 | 1.000000 | 0.000000 | |
| 252 | 2 | b | -0.029094 | -0.029094 | 1.000000 | 0.000000 | |
| 252 | 2 | c | 0.009133 | 0.009133 | 1.000000 | 0.000000 | |
| 252 | 2 | d | 0.188045 | 0.218636 | 0.984463 | -0.750896 | |
| 252 | 2 | e | -0.000931 | -0.000931 | 1.000000 | 0.000000 | |
| 252 | 2 | f | 0.095067 | 0.154452 | 0.983097 | -1.379562 | |
| 252 | 2 | g | 0.196328 | 0.233146 | 0.983441 | -0.876884 | |
| 252 | 2 | h | 0.024025 | 0.025611 | 0.999946 | -0.645404 | |
| 252 | 2 | J | 0.244992 | 0.269456 | 0.991456 | -0.818913 | |
| 252 | 2 | l | 0.000861 | 0.000946 | 1.000000 | -0.415749 | |
| 252 | 2 | m | 0.248129 | 0.275464 | 0.988087 | -0.776200 | |
| 252 | 2 | .n | 0.295229 | 0.309959 | 0.993682 | -0.581924 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## NOMINAL DEMONSTRATIVES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 203 | 1 | a | -0.105343 | -0.106148 | 0.999980 | 0.553864 | |
| 203 | 1 | d | -0.141626 | -0.160415 | 0.995277 | 0.851457 | |
| 203 | 1 | e | -0.001022 | -0.001022 | 1.000000 | 0.000000 | |
| 203 | 1 | h | 0.117064 | 0.104833 | 0.999526 | 1.737331 | |
| 203 | 1 | j | 0.072857 | 0.094659 | 0.993378 | -0.828564 | |
| 203 | 1 | m | -0.097276 | -0.112616 | 0.993226 | 0.577519 | |
| 203 | 1 | n | -0.012827 | -0.012665 | 0.992025 | -0.005580 | |
| 203 | 2 | a | -0.042574 | -0.043710 | 0.999964 | 0.582901 | |
| 203 | 2 | b | 0.005796 | 0.005370 | 0.999995 | 0.574551 | |
| 203 | 2 | c | -0.037613 | -0.038579 | 0.999974 | 0.585132 | |
| 203 | 2 | d | -0.070321 | -0.081952 | 0.997292 | 0.690755 | |
| 203 | 2 | e | -0.001022 | -0.001022 | 1.000000 | 0.000000 | |
| 203 | 2 | f | -0.036263 | -0.050291 | 0.997751 | 0.912521 | |
| 203 | 2 | g | -0.070989 | -0.083169 | 0.997262 | 0.719449 | |
| 203 | 2 | h | 0.069005 | 0.065814 | 0.999924 | 1.129174 | |
| 203 | 2 | j | 0.034705 | 0.026458 | 0.997600 | 0.519096 | |
| 203 | 2 | l | 0.002329 | 0.002250 | 1.000000 | 0.422963 | |
| 203 | 2 | m | -0.044468 | -0.059333 | 0.996541 | 0.780132 | |
| 203 | 2 | n | 0.004985 | -0.003015 | 0.996376 | 0.409634 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

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Page

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### NOMINAL DEMONSTRATIVES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 207 | 1 | a | 0.089728 | 0.088733 | 0.999863 | 0.269908 | |
| 207 | 1 | d | -0.006064 | 0.016294 | 0.972406 | -0.425710 | |
| 207 | 1 | e | -0.000956 | -0.000956 | 1.000000 | 0.000000 | |
| 207 | 1 | h | 0.213822 | 0.214531 | 0.999991 | -0.758070 | |
| 207 | 1 | j | 0.168212 | 0.160671 | 0.999335 | 0.935811 | |
| 207 | 1 | m | 0.099118 | 0.099707 | 0.993702 | -0.023563 | |
| 207 | 1 | n | 0.064855 | 0.063666 | 0.991169 | 0.040086 | |
| 207 | 2 | a | 0.069602 | 0.068528 | 0.999717 | 0.202447 | |
| 207 | 2 | b | 0.054739 | 0.054262 | 0.999936 | 0.188977 | |
| 207 | 2 | c | 0.070263 | 0.069245 | 0.999769 | 0.212202 | |
| 207 | 2 | d | 0.021932 | 0.057765 | 0.975297 | -0.721826 | |
| 207 | 2 | e | -0.000956 | -0.000956 | 1.000000 | 0.000000 | |
| 207 | 2 | f | -0.040281 | 0.018031 | 0.959633 | -0.918990 | |
| 207 | 2 | g | 0.018805 | 0.058379 | 0.974192 | -0.779983 | |
| 207 | 2 | h | 0.202720 | 0.203888 | 0.999983 | -0.909808 | |
| 207 | 2 | j | 0.193024 | 0.193242 | 0.999661 | -0.038158 | |
| 207 | 2 | l | 0.175987 | 0.179723 | 0.999665 | -0.655097 | |
| 207 | 2 | m | 0.121846 | 0.137139 | 0.994319 | -0.646824 | |
| 207 | 2 | n | 0.098820 | 0.117626 | 0.993677 | -0.752024 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

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Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## NOMINAL DEMONSTRATIVES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 212 | 1 | a | -0.532393 | -0.534533 | 0.999965 | 1.423618 | |
| 212 | 1 | d | -0.630979 | -0.609182 | 0.990609 | -0.972057 | |
| 212 | 1 | e | -0.281644 | -0.367326 | 0.976589 | 2.003152 | <**** |
| 212 | 1 | h | 0.089775 | 0.092420 | 0.999949 | -1.286973 | |
| 212 | 1 | j | -0.592539 | -0.564368 | 0.994148 | -1.491171 | |
| 212 | 1 | m | -0.663788 | -0.641139 | 0.992193 | -1.133026 | |
| 212 | 1 | n | -0.701485 | -0.686904 | 0.996452 | -1.132692 | |
| 212 | 2 | a | -0.553674 | -0.556193 | 0.999956 | 1.510422 | |
| 212 | 2 | b | -0.536118 | -0.537247 | 0.999990 | 1.407011 | |
| 212 | 2 | c | -0.560078 | -0.562278 | 0.993967 | 1.525915 | |
| 212 | 2 | d | -0.683127 | -0.609941 | 0.968614 | -1.737246 | |
| 212 | 2 | e | -0.288411 | -0.408138 | 0.969631 | 2.440264 | <**** |
| 212 | 2 | f | -0.681729 | -0.606058 | 0.960850 | -1.625723 | |
| 212 | 2 | g | -0.692679 | -0.616398 | 0.966042 | -1.751584 | |
| 212 | 2 | h | 0.055268 | 0.056689 | 0.999367 | -0.853978 | |
| 212 | 2 | j | -0.685346 | -0.640357 | 0.981874 | -1.459850 | |
| 212 | 2 | l | 0.004343 | 0.004507 | 1.000000 | -0.820542 | |
| 212 | 2 | m | -0.710908 | -0.652988 | 0.975446 | -1.623423 | |
| 212 | 2 | n | -0.731150 | -0.700484 | 0.990188 | -1.435622 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## NOMINAL DEMONSTRATIVES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 219 | 1 | a | -0.331415 | -0.331415 | 1.000000 | 0.000000 | |
| 219 | 1 | d | -0.431196 | -0.428167 | 0.962522 | -0.049107 | |
| 219 | 1 | e | -0.001101 | -0.001101 | 1.000000 | 0.000000 | |
| 219 | 1 | h | -0.738016 | -0.724187 | 0.959347 | -0.286572 | |
| 219 | 1 | j | -0.671656 | -0.654470 | 0.980216 | -0.459517 | |
| 219 | 1 | m | -0.541866 | -0.537656 | 0.971903 | -0.084605 | |
| 219 | 1 | n | -0.562968 | -0.551813 | 0.974578 | -0.238642 | |
| 219 | 2 | a | -0.253123 | -0.253123 | 1.000000 | 0.000000 | |
| 219 | 2 | b | -0.223322 | -0.223322 | 1.000000 | 0.000000 | |
| 219 | 2 | c | -0.264359 | -0.264359 | 1.000000 | 0.000000 | |
| 219 | 2 | d | -0.395491 | -0.379081 | 0.959384 | -0.250061 | |
| 219 | 2 | e | -0.001101 | -0.001101 | 1.000000 | 0.000000 | |
| 219 | 2 | f | -0.380616 | -0.357337 | 0.956167 | -0.338536 | |
| 219 | 2 | g | -0.404803 | -0.387454 | 0.959993 | -0.267448 | |
| 219 | 2 | h | -0.769917 | -0.742118 | 0.958057 | -0.584331 | |
| 219 | 2 | j | -0.594641 | -0.604725 | 0.974991 | 0.225788 | |
| 219 | 2 | l | -0.616435 | -0.637544 | 0.973718 | 0.471012 | |
| 219 | 2 | m | -0.504693 | -0.499509 | 0.970628 | -0.099139 | |
| 219 | 2 | n | -0.520418 | -0.514222 | 0.972638 | -0.124054 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## NOMINAL DEMONSTRATIVES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 221 | 1 | a | 0.044923 | 0.044756 | 0.999961 | 0.071199 | |
| 221 | 1 | d | 0.075409 | -0.001118 | 0.976299 | 1.318525 | |
| 221 | 1 | e | -0.000885 | -0.000685 | 1.000000 | 0.000000 | |
| 221 | 1 | h | -0.034912 | -0.042102 | 0.999526 | 0.874369 | |
| 221 | 1 | j | -0.072548 | -0.111765 | 0.965440 | 0.560721 | |
| 221 | 1 | m | 0.012463 | -0.050746 | 0.972285 | 1.006163 | |
| 221 | 1 | n | -0.082838 | -0.124017 | 0.973413 | 0.671893 | |
| 221 | 2 | a | 0.035569 | 0.035454 | 0.999933 | 0.037527 | |
| 221 | 2 | b | 0.024068 | 0.023727 | 0.999973 | 0.173684 | |
| 221 | 2 | c | 0.035314 | 0.035149 | 0.999942 | 0.057249 | |
| 221 | 2 | d | 0.040988 | -0.042582 | 0.966224 | 1.206113 | |
| 221 | 2 | e | -0.000885 | -0.000885 | 1.000000 | 0.000000 | |
| 221 | 2 | f | -0.003799 | -0.069580 | 0.970821 | 1.021014 | |
| 221 | 2 | g | 0.035177 | -0.048160 | 0.964882 | 1.179566 | |
| 221 | 2 | h | -0.034210 | -0.038443 | 0.999778 | 0.751501 | |
| 221 | 2 | j | -0.066140 | -0.115411 | 0.969342 | 0.747931 | |
| 221 | 2 | l | -0.001531 | -0.001531 | 1.000000 | 0.000000 | |
| 221 | 2 | m | -0.013498 | -0.079919 | 0.967568 | 0.978256 | |
| 221 | 2 | n | -0.092854 | -0.135324 | 0.973427 | 0.693911 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## NOMINAL DEMONSTRATIVES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 222 | 1 | a | -0.065303 | -0.065303 | 1.000000 | 0.000000 | |
| 222 | 1 | d | -0.407137 | -0.362235 | 0.966419 | -0.834865 | |
| 222 | 1 | e | -0.000884 | -0.000884 | 1.000000 | 0.000000 | |
| 222 | 1 | h | -0.182421 | -0.180458 | 0.999724 | -0.379519 | |
| 222 | 1 | j | -0.403934 | -0.384673 | 0.986290 | -0.564383 | |
| 222 | 1 | m | -0.430564 | -0.392961 | 0.971649 | -0.770674 | |
| 222 | 1 | n | -0.194080 | -0.191052 | 0.990843 | -0.101972 | |
| 222 | 2 | a | -0.076259 | -0.076259 | 1.000000 | 0.000000 | |
| 222 | 2 | b | -0.063133 | -0.063133 | 1.000000 | 0.000000 | |
| 222 | 2 | c | -0.073564 | -0.073564 | 1.000000 | 0.000000 | |
| 222 | 2 | d | -0.410846 | -0.366092 | 0.971400 | -0.901713 | |
| 222 | 2 | e | -0.000884 | -0.000884 | 1.000000 | 0.000000 | |
| 222 | 2 | f | -0.338840 | -0.291939 | 0.956741 | -0.749853 | |
| 222 | 2 | g | -0.410581 | -0.363829 | 0.966927 | -0.876184 | |
| 222 | 2 | h | -0.022308 | -0.022041 | 0.999997 | -0.529832 | |
| 222 | 2 | j | -0.430670 | -0.395590 | 0.978939 | -0.833251 | |
| 222 | 2 | l | -0.002454 | -0.002434 | 1.000000 | -0.223601 | |
| 222 | 2 | m | -0.442443 | -0.399871 | 0.971535 | -0.872841 | |
| 222 | 2 | n | -0.256865 | -0.242209 | 0.989115 | -0.458413 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### NOMINAL DEMONSTRATIVES

| | | | Correlation Coefficiants | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 223 | 1 | a | -0.732594 | -0.732594 | 1.000000 | 0.000000 | |
| 223 | 1 | d | -0.694873 | -0.673473 | 0.991966 | -0.836911 | |
| 223 | 1 | e | -0.000648 | -0.000648 | 1.000000 | 0.000000 | |
| 223 | 1 | h | -0.373036 | -0.373048 | 1.000000 | 0.364864 | |
| 223 | 1 | j | -0.422509 | -0.421755 | 0.999917 | -0.241072 | |
| 223 | 1 | m | -0.695676 | -0.674331 | 0.994234 | -0.972685 | |
| 223 | 1 | n | -0.639829 | -0.612636 | 0.993787 | -1.110079 | |
| 223 | 2 | a | -0.754136 | -0.754136 | 1.000000 | 0.000000 | |
| 223 | 2 | b | -0.718551 | -0.718551 | 1.000000 | 0.000000 | |
| 223 | 2 | c | -0.752835 | -0.752835 | 1.000000 | 0.000000 | |
| 223 | 2 | d | -0.732325 | -0.670997 | 0.978573 | -1.397333 | |
| 223 | 2 | e | -0.000648 | -0.000648 | 1.000000 | 0.000000 | |
| 223 | 2 | f | -0.709220 | -0.631819 | 0.972828 | -1.497024 | |
| 223 | 2 | g | -0.731842 | -0.667450 | 0.977200 | -1.415382 | |
| 223 | 2 | h | -0.361158 | -0.361167 | 1.000000 | 0.326963 | |
| 223 | 2 | j | -0.389875 | -0.391874 | 0.999818 | 0.424475 | |
| 223 | 2 | l | -0.315803 | -0.315787 | 1.000000 | -0.442164 | |
| 223 | 2 | m | -0.726692 | -0.696036 | 0.982395 | -0.840189 | |
| 223 | 2 | n | -0.670259 | -0.634363 | 0.980962 | -0.873345 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## NOMINAL DEMONSTRATIVES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 227 | 1 | a | -0.128573 | -0.128573 | 1.000000 | 0.000000 | |
| 227 | 1 | d | -0.321199 | -0.282110 | 0.914091 | -0.442966 | |
| 227 | 1 | e | -0.000658 | -0.000658 | 1.000000 | 0.000000 | |
| 227 | 1 | h | 0.333390 | 0.339230 | 0.990074 | -0.196856 | |
| 227 | 1 | j | 0.059223 | 0.091133 | 0.963962 | -0.533222 | |
| 227 | 1 | m | -0.227812 | -0.182803 | 0.923801 | -0.527222 | |
| 227 | 1 | n | -0.061523 | -0.058520 | 0.942958 | -0.039835 | |
| 227 | 2 | a | -0.122705 | -0.122705 | 1.000000 | 0.000000 | |
| 227 | 2 | b | -0.133699 | -0.133699 | 1.000000 | 0.000000 | |
| 227 | 2 | c | -0.126353 | -0.126353 | 1.000000 | 0.000000 | |
| 227 | 2 | d | -0.288205 | -0.207730 | 0.891892 | -0.800005 | |
| 227 | 2 | e | -0.000658 | -0.000658 | 1.000000 | 0.000000 | |
| 227 | 2 | f | -0.282278 | -0.193110 | 0.881723 | -0.845620 | |
| 227 | 2 | g | -0.290104 | -0.201262 | 0.880707 | -0.840625 | |
| 227 | 2 | h | 0.331148 | 0.336789 | 0.997307 | -0.364300 | |
| 227 | 2 | j | 0.023736 | 0.066934 | 0.941332 | -0.564943 | |
| 227 | 2 | l | 0.037912 | 0.094829 | 0.985476 | -1.497451 | |
| 227 | 2 | m | -0.214012 | -0.140513 | 0.898157 | -0.741197 | |
| 227 | 2 | n | -0.066552 | -0.041382 | 0.925626 | -0.292365 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### NOMINAL DEMONSTRATIVES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 230 | 1 | a | -0.373570 | -0.373570 | 1.000000 | 0.000000 | |
| 230 | 1 | d | -0.251948 | -0.193763 | 0.992150 | -2.044762 | <**** |
| 230 | 1 | e | -0.000600 | -0.000600 | 1.000000 | 0.000000 | |
| 230 | 1 | h | 0.076769 | 0.083894 | 0.999782 | -1.492281 | |
| 230 | 1 | j | 0.058008 | 0.085373 | 0.997907 | -1.846177 | |
| 230 | 1 | m | -0.102239 | -0.033802 | 0.989282 | -2.042462 | <**** |
| 230 | 1 | n | -0.169797 | -0.093877 | 0.986758 | -2.043883 | <**** |
| 230 | 2 | a | -0.305620 | -0.305620 | 1.000000 | 0.000000 | |
| 230 | 2 | b | -0.234657 | -0.234657 | 1.000000 | 0.000000 | |
| 230 | 2 | c | -0.301274 | -0.301274 | 1.000000 | 0.000000 | |
| 230 | 2 | d | -0.137532 | -0.153679 | 0.995213 | -1.966987 | <**** |
| 230 | 2 | e | -0.000600 | -0.000600 | 1.000000 | 0.000000 | |
| 230 | 2 | f | -0.149564 | -0.120400 | 0.997755 | -1.905176 | |
| 230 | 2 | g | -0.196159 | -0.153784 | 0.995524 | -1.965533 | <**** |
| 230 | 2 | h | 0.064555 | 0.072050 | 0.999776 | -1.545534 | |
| 230 | 2 | j | 0.074391 | 0.091716 | 0.999212 | -1.905873 | |
| 230 | 2 | l | 0.073664 | 0.077823 | 0.999931 | -1.548143 | |
| 230 | 2 | m | -0.075132 | -0.026887 | 0.994336 | -1.978446 | <**** |
| 230 | 2 | n | -0.137167 | -0.087740 | 0.994160 | -2.000038 | <**** |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## NOMINAL DEMONSTRATIVES

|  |  |  | Correlation Coefficients |  |  | Significance Level |  |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 235 | 1 | a | -0.031123 | -0.031123 | 1.000000 | 0.000000 |  |
| 235 | 1 | d | -0.329375 | -0.327040 | 0.987682 | -0.066835 |  |
| 235 | 1 | e | -0.000931 | -0.000931 | 1.000000 | 0.000000 |  |
| 235 | 1 | h | -0.094045 | -0.247013 | 0.946995 | 2.020411 | (**** |
| 235 | 1 | j | -0.506407 | -0.510119 | 0.991283 | 0.138534 |  |
| 235 | 1 | m | -0.397157 | -0.402545 | 0.989366 | 0.171048 |  |
| 235 | 1 | n | -0.457890 | -0.471652 | 0.991153 | 0.493903 |  |
| 235 | 2 | a | -0.160684 | -0.160684 | 1.000000 | 0.000000 |  |
| 235 | 2 | b | -0.226216 | -0.226216 | 1.000000 | 0.000000 |  |
| 235 | 2 | c | -0.155708 | -0.155708 | 1.000000 | 0.000000 |  |
| 235 | 2 | d | -0.361740 | -0.362743 | 0.989625 | 0.031704 |  |
| 235 | 2 | e | -0.000931 | -0.000931 | 1.000000 | 0.000000 |  |
| 235 | 2 | f | -0.412523 | -0.426475 | 0.987749 | 0.415838 |  |
| 235 | 2 | g | -0.362648 | -0.366155 | 0.989273 | 0.109119 |  |
| 235 | 2 | h | -0.126989 | -0.144205 | 0.998618 | 1.398178 |  |
| 235 | 2 | j | -0.453489 | -0.464915 | 0.992450 | 0.442774 |  |
| 235 | 2 | l | -0.014128 | -0.015324 | 0.999989 | 1.097803 |  |
| 235 | 2 | m | -0.403257 | -0.412923 | 0.990933 | 0.333222 |  |
| 235 | 2 | n | -0.434261 | -0.452864 | 0.992461 | 0.711631 |  |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### NOMINAL DEMONSTRATIVES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 248 | 1 | a | -0.174181 | -0.171062 | 0.999898 | -0.990842 | |
| 248 | 1 | d | -0.376824 | -0.471730 | 0.951889 | 1.475685 | |
| 248 | 1 | e | -0.001000 | -0.001000 | 1.000000 | 0.000000 | |
| 248 | 1 | h | -0.209710 | -0.209658 | 1.000000 | -0.570606 | |
| 248 | 1 | j | -0.240205 | -0.265625 | 0.998324 | 1.990975 | (**** |
| 248 | 1 | m | -0.384995 | -0.462279 | 0.380726 | 1.857652 | |
| 248 | 1 | n | -0.315971 | -0.383744 | 0.986235 | 1.889339 | |
| 248 | 2 | a | -0.162555 | -0.158754 | 0.999855 | -1.010935 | |
| 248 | 2 | b | -0.162328 | -0.160639 | 0.999969 | -0.978255 | |
| 248 | 2 | c | -0.165652 | -0.162231 | 0.999882 | -1.006056 | |
| 248 | 2 | d | -0.388644 | -0.445397 | 0.946089 | 0.846063 | |
| 248 | 2 | e | -0.001000 | -0.001000 | 1.000000 | 0.000000 | |
| 248 | 2 | f | -0.387811 | -0.420513 | 0.911508 | 0.381212 | |
| 248 | 2 | g | -0.385112 | -0.439403 | 0.937375 | 0.750970 | |
| 248 | 2 | h | -0.209574 | -0.209548 | 1.000000 | -0.414941 | |
| 248 | 2 | j | -0.253679 | -0.265486 | 0.999056 | 1.248458 | |
| 248 | 2 | l | -0.206419 | -0.206393 | 1.000000 | -0.588891 | |
| 248 | 2 | m | -0.426066 | -0.473893 | 0.972654 | 1.010930 | |
| 248 | 2 | n | -0.348954 | -0.399141 | 0.985413 | 1.390164 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## NOMINAL DEMONSTRATIVES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 252 | 1 | a | 0.087821 | 0.087821 | 1.000000 | 0.000000 | |
| 252 | 1 | d | 0.146321 | 0.143051 | 0.993549 | 0.123453 | |
| 252 | 1 | e | -0.000931 | -0.000931 | 1.000000 | 0.000000 | |
| 252 | 1 | h | 0.187661 | 0.183418 | 0.997165 | 0.243299 | |
| 252 | 1 | j | 0.209856 | 0.227944 | 0.991894 | -0.616895 | |
| 252 | 1 | m | 0.200105 | 0.204179 | 0.996458 | -0.209669 | |
| 252 | 1 | n | 0.253456 | 0.257340 | 0.998579 | -0.319601 | |
| 252 | 2 | a | 0.006594 | 0.006594 | 1.000000 | 0.000000 | |
| 252 | 2 | b | -0.029094 | -0.029094 | 1.000000 | 0.000000 | |
| 252 | 2 | c | 0.009133 | 0.009133 | 1.000000 | 0.000000 | |
| 252 | 2 | d | 0.188045 | 0.209631 | 0.991000 | -0.695632 | |
| 252 | 2 | e | -0.000931 | -0.000931 | 1.000000 | 0.000000 | |
| 252 | 2 | f | 0.095067 | 0.136398 | 0.978952 | -0.860338 | |
| 252 | 2 | g | 0.196328 | 0.221539 | 0.988708 | -0.726679 | |
| 252 | 2 | h | 0.024025 | 0.025375 | 0.999978 | -0.867120 | |
| 252 | 2 | j | 0.244992 | 0.263321 | 0.995845 | -0.878531 | |
| 252 | 2 | l | 0.900861 | 0.000931 | 1.000000 | -0.374169 | |
| 252 | 2 | m | 0.248129 | 0.267009 | 0.993097 | -0.703734 | |
| 252 | 2 | n | 0.295229 | 0.307327 | 0.996937 | -0.685320 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## RELATIVE PRONOUNS

|  |  |  | Correlation Coefficients |  |  | Significance Level |  |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 203 | 1 | a | -0.105343 | -0.106148 | 0.999980 | 0.553864 |  |
| 203 | 1 | d | -0.141626 | -0.164897 | 0.998851 | 2.123474 | <**** |
| 203 | 1 | e | -0.001022 | -0.001022 | 1.000000 | 0.000000 |  |
| 203 | 1 | h | 0.117064 | 0.112489 | 0.998845 | 0.417553 |  |
| 203 | 1 | j | 0.072857 | 0.044487 | 0.997839 | 1.882983 |  |
| 203 | 1 | m | -0.097276 | -0.120785 | 0.998426 | 1.831821 |  |
| 203 | 1 | n | -0.012827 | -0.034324 | 0.997144 | 1.240257 |  |
| 203 | 2 | a | -0.042574 | -0.043710 | 0.999964 | 0.582901 |  |
| 203 | 2 | b | 0.005796 | 0.005370 | 0.999995 | 0.574551 |  |
| 203 | 2 | c | -0.037613 | -0.038579 | 0.999974 | 0.585132 |  |
| 203 | 2 | d | -0.070321 | -0.087550 | 0.998257 | 1.275061 |  |
| 203 | 2 | e | -0.001022 | -0.001022 | 1.000000 | 0.000000 |  |
| 203 | 2 | f | -0.036263 | -0.046142 | 0.998636 | 0.825071 |  |
| 203 | 2 | g | -0.070989 | -0.087114 | 0.998248 | 1.190405 |  |
| 203 | 2 | h | 0.069005 | 0.066168 | 0.999664 | 0.477835 |  |
| 203 | 2 | j | 0.034705 | 0.016007 | 0.997727 | 1.209191 |  |
| 203 | 2 | l | 0.002329 | 0.002293 | 0.999999 | 0.130191 |  |
| 203 | 2 | m | -0.044468 | -0.063126 | 0.997800 | 1.227605 |  |
| 203 | 2 | n | 0.004985 | -0.015586 | 0.996083 | 1.013236 |  |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## RELATIVE PRONOUNS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 207 | 1 | a | 0.089728 | 0.088733 | 0.999863 | 0.269908 | |
| 207 | 1 | d | -0.006064 | -0.002993 | 0.985863 | -0.081692 | |
| 207 | 1 | e | -0.000956 | -0.000956 | 1.000000 | 0.000000 | |
| 207 | 1 | h | 0.213822 | 0.213839 | 1.000000 | -0.149109 | |
| 207 | 1 | j | 0.168212 | 0.168826 | 0.999672 | -0.108723 | |
| 207 | 1 | m | 0.099118 | 0.100167 | 0.994839 | -0.046379 | |
| 207 | 1 | n | 0.064855 | 0.066004 | 0.995427 | -0.053844 | |
| 207 | 2 | a | 0.069602 | 0.068528 | 0.999717 | 0.202447 | |
| 207 | 2 | b | 0.054739 | 0.054262 | 0.999936 | 0.188977 | |
| 207 | 2 | c | 0.070263 | 0.069245 | 0.999769 | 0.212202 | |
| 207 | 2 | d | 0.021932 | 0.024626 | 0.983560 | -0.066469 | |
| 207 | 2 | e | -0.000956 | -0.000956 | 1.000000 | 0.000000 | |
| 207 | 2 | f | -0.040281 | -0.032108 | 0.975500 | -0.165235 | |
| 207 | 2 | g | 0.018805 | 0.021765 | 0.982335 | -0.070929 | |
| 207 | 2 | h | 0.202720 | 0.202758 | 1.000000 | -0.282227 | |
| 207 | 2 | j | 0.193024 | 0.193883 | 0.999780 | -0.186594 | |
| 207 | 2 | l | 0.175987 | 0.176014 | 1.000000 | -0.304390 | |
| 207 | 2 | m | 0.121846 | 0.123271 | 0.994608 | -0.061867 | |
| 207 | 2 | n | 0.098820 | 0.101466 | 0.995933 | -0.132850 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## RELATIVE PRONOUNS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 212 | 1 | a | -0.532393 | -0.534533 | 0.999965 | 1.423618 | |
| 212 | 1 | d | -0.630979 | -0.623503 | 0.993079 | -0.398576 | |
| 212 | 1 | e | -0.281644 | -0.357325 | 0.981454 | 1.985336 | <**** |
| 212 | 1 | h | 0.089775 | 0.095909 | 0.999810 | -1.546373 | |
| 212 | 1 | j | -0.592539 | -0.567812 | 0.988673 | -0.970118 | |
| 212 | 1 | m | -0.663788 | -0.654131 | 0.993403 | -0.543840 | |
| 212 | 1 | n | -0.701485 | -0.693472 | 0.994068 | -0.499836 | |
| 212 | 2 | a | -0.553674 | -0.556193 | 0.999956 | 1.510422 | |
| 212 | 2 | b | -0.536118 | -0.537247 | 0.999990 | 1.407011 | |
| 212 | 2 | c | -0.560078 | -0.562278 | 0.999967 | 1.525915 | |
| 212 | 2 | d | -0.683127 | -0.658219 | 0.988943 | -1.072763 | |
| 212 | 2 | e | -0.288411 | -0.364032 | 0.988204 | 2.453464 | <**** |
| 212 | 2 | f | -0.681729 | -0.668706 | 0.987318 | -0.540059 | |
| 212 | 2 | g | -0.692679 | -0.668444 | 0.988268 | -1.028006 | |
| 212 | 2 | h | 0.055268 | 0.057284 | 0.999917 | -0.769452 | |
| 212 | 2 | j | -0.685346 | -0.673404 | 0.992149 | -0.630063 | |
| 212 | 2 | l | 0.004343 | 0.004398 | 1.000000 | -0.496427 | |
| 212 | 2 | m | -0.710908 | -0.694421 | 0.991103 | -0.834453 | |
| 212 | 2 | n | -0.731150 | -0.724208 | 0.995448 | -0.515767 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

### A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## RELATIVE PRONOUNS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 219 | 1 | a | -0.331415 | -0.331415 | 1.000000 | 0.000000 | |
| 219 | 1 | d | -0.431196 | -0.498884 | 0.988495 | 1.872636 | |
| 219 | 1 | e | -0.001101 | -0.001101 | 1.000000 | 0.000000 | |
| 219 | 1 | h | -0.738016 | -0.754061 | 0.977807 | 0.455770 | |
| 219 | 1 | j | -0.671656 | -0.710030 | 0.993201 | 1.602030 | |
| 219 | 1 | m | -0.541866 | -0.583768 | 0.994165 | 1.709219 | |
| 219 | 1 | n | -0.562968 | -0.602841 | 0.995046 | 1.767546 | |
| 219 | 2 | a | -0.253123 | -0.253123 | 1.000000 | 0.000000 | |
| 219 | 2 | b | -0.223322 | -0.223322 | 1.000000 | 0.000000 | |
| 219 | 2 | c | -0.264359 | -0.264359 | 1.000000 | 0.000000 | |
| 219 | 2 | d | -0.395491 | -0.487634 | 0.984689 | 2.149739 | <**** |
| 219 | 2 | e | -0.001101 | -0.001101 | 1.000000 | 0.000000 | |
| 219 | 2 | f | -0.380616 | -0.476709 | 0.982824 | 2.120405 | <**** |
| 219 | 2 | g | -0.404803 | -0.497617 | 0.984036 | 2.127564 | <**** |
| 219 | 2 | h | -0.769917 | -0.781381 | 0.977978 | 0.346766 | |
| 219 | 2 | j | -0.594641 | -0.644089 | 0.993171 | 1.869720 | |
| 219 | 2 | l | -0.616435 | -0.661971 | 0.985519 | 1.303017 | |
| 219 | 2 | m | -0.504693 | -0.567119 | 0.991819 | 2.041780 | <**** |
| 219 | 2 | n | -0.520418 | -0.575407 | 0.994148 | 2.108793 | <**** |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

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A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## RELATIVE PRONOUNS

|  |  |  | Correlation Coefficients |  |  | Significance Level |  |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 221 | 1 | a | 0.044923 | 0.044756 | 0.999961 | 0.071199 |  |
| 221 | 1 | d | 0.075409 | 0.023421 | 0.986470 | 1.184675 |  |
| 221 | 1 | e | -0.000885 | -0.000885 | 1.000000 | 0.000000 |  |
| 221 | 1 | h | -0.034912 | -0.042933 | 0.999682 | 1.190980 |  |
| 221 | 1 | j | -0.072548 | -0.111107 | 0.987392 | 0.912237 |  |
| 221 | 1 | m | 0.012463 | -0.033502 | 0.986504 | 1.047693 |  |
| 221 | 1 | n | -0.082838 | -0.117352 | 0.988757 | 0.865258 |  |
| 221 | 2 | a | 0.035569 | 0.035454 | 0.999933 | 0.037527 |  |
| 221 | 2 | b | 0.024068 | 0.023727 | 0.999973 | 0.173684 |  |
| 221 | 2 | c | 0.035314 | 0.035149 | 0.999942 | 0.057249 |  |
| 221 | 2 | d | 0.040988 | -0.023433 | 0.981267 | 1.247183 |  |
| 221 | 2 | e | -0.000885 | -0.000885 | 1.000000 | 0.000000 |  |
| 221 | 2 | f | -0.003799 | -0.059320 | 0.985956 | 1.241323 |  |
| 221 | 2 | g | 0.035177 | -0.030448 | 0.980937 | 1.259488 |  |
| 221 | 2 | h | -0.034210 | -0.039901 | 0.999854 | 1.244787 |  |
| 221 | 2 | j | -0.066140 | -0.107814 | 0.987380 | 0.985108 |  |
| 221 | 2 | l | -0.001531 | -0.001531 | 1.000000 | 0.000000 |  |
| 221 | 2 | m | -0.013498 | -0.065346 | 0.985043 | 1.123404 |  |
| 221 | 2 | n | -0.092854 | -0.128436 | 0.989195 | 0.910719 |  |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## RELATIVE PRONOUNS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 222 | 1 | a | -0.065303 | -0.065303 | 1.000000 | 0.000000 | |
| 222 | 1 | d | -0.407137 | -0.425795 | 0.994763 | 0.887940 | |
| 222 | 1 | e | -0.000884 | -0.000884 | 1.000000 | 0.000000 | |
| 222 | 1 | h | -0.182421 | -0.182851 | 0.999987 | 0.385119 | |
| 222 | 1 | j | -0.403934 | -0.412879 | 0.994999 | 0.437311 | |
| 222 | 1 | m | -0.430564 | -0.443776 | 0.995146 | 0.662838 | |
| 222 | 1 | n | -0.194080 | -0.195484 | 0.998009 | 0.101443 | |
| 222 | 2 | a | -0.075259 | -0.076259 | 1.000000 | 0.000000 | |
| 222 | 2 | b | -0.063133 | -0.063133 | 1.000000 | 0.000000 | |
| 222 | 2 | c | -0.073564 | -0.073564 | 1.000000 | 0.000000 | |
| 222 | 2 | d | -0.410846 | -0.423575 | 0.996817 | 0.7/9034 | |
| 222 | 2 | e | -0.000884 | -0.000884 | 1.000000 | 0.000000 | |
| 222 | 2 | f | -0.338840 | -0.353499 | 0.996737 | 0.859394 | |
| 222 | 2 | g | -0.410581 | -0.423674 | 0.996720 | 0.789160 | |
| 222 | 2 | h | -0.022308 | -0.022367 | 1.000000 | 0.407233 | |
| 222 | 2 | j | -0.430670 | -0.438467 | 0.997046 | 0.501973 | |
| 222 | 2 | l | -0.002454 | -0.002558 | 1.000000 | 1.162750 | |
| 222 | 2 | m | -0.442443 | -0.453278 | 0.996697 | 0.662604 | |
| 222 | 2 | n | -0.256865 | -0.256084 | 0.999213 | -0.091133 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### RELATIVE PRONOUNS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 223 | 1 | a | -0.732594 | -0.732594 | 1.000000 | 0.000000 | |
| 223 | 1 | d | -0.694873 | -0.698793 | 0.997560 | 0.291609 | |
| 223 | 1 | e | -0.000648 | -0.000648 | 1.000000 | 0.000000 | |
| 223 | 1 | h | -0.373036 | -0.372969 | 1.000000 | -0.461154 | |
| 223 | 1 | j | -0.422509 | -0.421740 | 0.999847 | -0.181020 | |
| 223 | 1 | m | -0.695676 | -0.702973 | 0.996926 | 0.481499 | |
| 223 | 1 | n | -0.639829 | -0.657796 | 0.993868 | 0.776773 | |
| 223 | 2 | a | -0.754136 | -0.754136 | 1.000000 | 0.000000 | |
| 223 | 2 | b | -0.718551 | -0.718551 | 1.000000 | 0.000000 | |
| 223 | 2 | c | -0.752835 | -0.752835 | 1.000000 | 0.000000 | |
| 223 | 2 | d | -0.732325 | -0.737229 | 0.997075 | 0.351518 | |
| 223 | 2 | e | -0.000648 | -0.000648 | 1.000000 | 0.000000 | |
| 223 | 2 | f | -0.709220 | -0.718622 | 0.997960 | 0.761672 | |
| 223 | 2 | g | -0.731842 | -0.736598 | 0.997224 | 0.349586 | |
| 223 | 2 | h | -0.361158 | -0.360504 | 0.999993 | -0.705861 | |
| 223 | 2 | j | -0.389875 | -0.389767 | 0.999917 | -0.034085 | |
| 223 | 2 | l | -0.315803 | -0.315534 | 0.999999 | -0.862837 | |
| 223 | 2 | m | -0.726692 | -0.735723 | 0.997116 | 0.637447 | |
| 223 | 2 | n | -0.670259 | -0.688063 | 0.994686 | 0.849540 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## RELATIVE PRONOUNS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 227 | 1 | a | -0.128573 | -0.128573 | 1.000000 | 0.000000 | |
| 227 | 1 | d | -0.321199 | -0.333884 | 0.967730 | 0.236489 | |
| 227 | 1 | e | -0.000658 | -0.000658 | 1.000000 | 0.000000 | |
| 227 | 1 | h | 0.333390 | 0.337967 | 0.990109 | -0.154540 | |
| 227 | 1 | j | 0.059223 | 0.032169 | 0.994746 | 1.181649 | |
| 227 | 1 | m | -0.227812 | -0.256474 | 0.983208 | 0.719669 | |
| 227 | 1 | n | -0.061523 | -0.100363 | 0.990614 | 1.271679 | |
| 227 | 2 | a | -0.122705 | -0.122705 | 1.000000 | 0.000000 | |
| 227 | 2 | b | -0.133699 | -0.133699 | 1.000000 | 0.000000 | |
| 227 | 2 | c | -0.126353 | -0.126353 | 1.000000 | 0.000000 | |
| 227 | 2 | d | -0.288205 | -0.304077 | 0.953233 | 0.243191 | |
| 227 | 2 | e | -0.000658 | -0.000658 | 1.000000 | 0.000000 | |
| 227 | 2 | f | -0.282278 | -0.309691 | 0.959723 | 0.452175 | |
| 227 | 2 | g | -0.290104 | -0.307485 | 0.949699 | 0.257034 | |
| 227 | 2 | h | 0.331148 | 0.336421 | 0.997302 | -0.340260 | |
| 227 | 2 | j | 0.023736 | 0.009103 | 0.987400 | 0.412338 | |
| 227 | 2 | l | 0.037512 | 0.094536 | 0.985449 | -1.488346 | |
| 227 | 2 | m | -0.214012 | -0.238251 | 0.966808 | 0.431890 | |
| 227 | 2 | n | -0.066552 | -0.097547 | 0.986636 | 0.850753 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Te. . Weighting Schemes: See Result Page R-1

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Page

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### RELATIVE PRONOUNS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 230 | 1 | a | -0.373570 | -0.373570 | 1.000000 | 0.000000 | |
| 230 | 1 | d | -0.251948 | -0.206694 | 0.996406 | -2.337259 | (**** |
| 230 | 1 | e | -0.000600 | -0.000600 | 1.000000 | 0.000000 | |
| 230 | 1 | h | 0.076769 | 0.078775 | 0.999878 | -0.562023 | |
| 230 | 1 | j | 0.058008 | 0.060077 | 0.999310 | -0.243284 | |
| 230 | 1 | m | -0.102239 | -0.081183 | 0.993916 | -0.835304 | |
| 230 | 1 | n | -0.169797 | -0.154411 | 0.998159 | -1.117259 | |
| 230 | 2 | a | -0.305620 | -0.305620 | 1.000000 | 0.000000 | |
| 230 | 2 | b | -0.234657 | -0.234657 | 1.000000 | 0.000000 | |
| 230 | 2 | c | -0.301274 | -0.301274 | 1.000000 | 0.000000 | |
| 230 | 2 | d | -0.197532 | -0.140121 | 0.995011 | -2.508480 | (**** |
| 230 | 2 | e | -0.000600 | -0.000600 | 1.000000 | 0.000000 | |
| 230 | 2 | f | -0.149564 | -0.100839 | 0.996083 | -2.403394 | (**** |
| 230 | 2 | g | -0.196159 | -0.139163 | 0.994956 | -2.477595 | (**** |
| 230 | 2 | h | 0.064555 | 0.067459 | 0.999751 | -0.579594 | |
| 230 | 2 | j | 0.074391 | 0.085987 | 0.995579 | -0.539230 | |
| 230 | 2 | l | 0.073664 | 0.077534 | 0.999564 | -0.572658 | |
| 230 | 2 | m | -0.075132 | -0.032329 | 0.993257 | -1.609020 | |
| 230 | 2 | n | -0.137167 | -0.086693 | 0.995136 | -2.235707 | (**** |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### RELATIVE PRONOUNS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 235 | 1 | a | -0.031123 | -0.031123 | 1.000000 | 0.000000 | |
| 235 | 1 | d | -0.329375 | -0.399434 | 0.986186 | 1.850739 | |
| 235 | 1 | e | -0.000931 | -0.000931 | 1.000000 | 0.000000 | |
| 235 | 1 | h | -0.094045 | -0.129838 | 0.987257 | 0.956826 | |
| 235 | 1 | j | -0.506407 | -0.541177 | 0.975213 | 0.769463 | |
| 235 | 1 | m | -0.397157 | -0.460244 | 0.982322 | 1.522810 | |
| 235 | 1 | n | -0.457890 | -0.509970 | 0.980055 | 1.229786 | |
| 235 | 2 | a | -0.160684 | -0.160684 | 1.000000 | 0.000000 | |
| 235 | 2 | b | -0.226216 | -0.226216 | 1.000000 | 0.000000 | |
| 235 | 2 | c | -0.155708 | -0.155708 | 1.000000 | 0.000000 | |
| 235 | 2 | d | -0.361740 | -0.419628 | 0.987110 | 1.609210 | |
| 235 | 2 | e | -0.000931 | -0.000931 | 1.000000 | 0.000000 | |
| 235 | 2 | f | -0.412523 | -0.466748 | 0.986055 | 1.481726 | |
| 235 | 2 | g | -0.362648 | -0.420482 | 0.986986 | 1.601014 | |
| 235 | 2 | h | -0.126989 | -0.137956 | 0.998150 | 0.771022 | |
| 235 | 2 | j | -0.453489 | -0.509340 | 0.981978 | 1.374888 | |
| 235 | 2 | l | -0.014128 | -0.015413 | 0.999980 | 0.860525 | |
| 235 | 2 | m | -0.403257 | -0.465795 | 0.985032 | 1.633771 | |
| 235 | 2 | n | -0.434261 | -0.494363 | 0.984853 | 1.582275 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## RELATIVE PRONOUNS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 248 | 1 | a | -0.174181 | -0.171062 | 0.999898 | -0.990842 | |
| 248 | 1 | c | -0.376824 | -0.337026 | 0.940801 | -0.553664 | |
| 248 | 1 | e | -0.001000 | -0.(01000 | 1.000000 | 0.000000 | |
| 248 | 1 | h | -0.209710 | -0.209649 | 1.000000 | -1.213183 | |
| 248 | 1 | j | -0.240205 | -0.233500 | 0.998365 | -0.539117 | |
| 248 | 1 | m | -0.384995 | -0.360608 | 0.978155 | -0.561105 | |
| 248 | 1 | n | -0.315971 | -0.296292 | 0.987527 | -0.584208 | |
| 248 | 2 | a | -0.162555 | -0.158754 | 0.999855 | -1.010935 | |
| 248 | 2 | b | -0.162328 | -0.160639 | 0.999969 | -0.978255 | |
| 248 | 2 | c | -0.165652 | -0.162231 | 0.999882 | -1.006056 | |
| 248 | 2 | d | -0.388644 | -0.366638 | 0.944120 | -0.318389 | |
| 248 | 2 | e | -0.001000 | -0.001000 | 1.000000 | 0.000000 | |
| 248 | 2 | f | -0.387811 | -0.349852 | 0.934141 | -0.503549 | |
| 248 | 2 | g | -0.385112 | -0.362132 | 0.940619 | -0.321994 | |
| 248 | 2 | h | -0.209574 | -0.209543 | 1.000000 | -0.862734 | |
| 248 | 2 | j | -0.253679 | -0.247293 | 0.998910 | -0.630726 | |
| 248 | 2 | l | -0.206419 | -0.206393 | 1.000000 | -0.627168 | |
| 248 | 2 | m | -0.426066 | -0.414015 | 0.973895 | -0.260055 | |
| 248 | 2 | n | -0.348954 | -0.337393 | 0.986337 | -0.332816 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### RELATIVE PRONOUNS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 252 | 1 | a | 0.087821 | 0.087821 | 1.000000 | 0.000000 | |
| 252 | 1 | d | 0.146321 | 0.261077 | 0.968427 | -1.962495 | <**** |
| 252 | 1 | e | -0.000931 | -0.000931 | 1.000000 | 0.000000 | |
| 252 | 1 | h | 0.187661 | 0.214784 | 0.997835 | -1.766706 | |
| 252 | 1 | j | 0.209856 | 0.322890 | 0.974105 | -2.137546 | <**** |
| 252 | 1 | m | 0.200105 | 0.294093 | 0.979743 | -2.009274 | <**** |
| 252 | 1 | n | 0.253456 | 0.303011 | 0.991606 | -1.660919 | |
| 252 | 2 | a | 0.006594 | 0.006594 | 1.000000 | 0.000000 | |
| 252 | 2 | b | -0.029094 | -0.029094 | 1.000000 | 0.000000 | |
| 252 | 2 | c | 0.009133 | 0.009133 | 1.000000 | 0.000000 | |
| 252 | 2 | d | 0.188045 | 0.233418 | 0.989041 | -1.322697 | |
| 252 | 2 | e | -0.000931 | -0.000931 | 1.000000 | 0.000000 | |
| 252 | 2 | f | 0.035067 | 0.093920 | 0.993518 | 0.042944 | |
| 252 | 2 | g | 0.196328 | 0.231480 | 0.990525 | -1.104512 | |
| 252 | 2 | h | 0.024025 | 0.028344 | 0.999957 | -1.978265 | <**** |
| 252 | 2 | j | 0.244992 | 0.297828 | 0.991662 | -1.770730 | |
| 252 | 2 | i | 0.000861 | 0.001181 | 1.000000 | -1.939500 | |
| 252 | 2 | m | 0.248129 | 0.288191 | 0.992227 | -1.399396 | |
| 252 | 2 | n | 0.295229 | 0.316754 | 0.995733 | -1.030039 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## NOMINAL SUBSTITUTES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 203 | 1 | a | -0.105343 | -0.106148 | 0.999980 | 0.553864 | |
| 203 | 1 | d | -0.141626 | -0.122017 | 0.997337 | -1.179376 | |
| 203 | 1 | e | -0.001022 | -0.001022 | 1.000000 | 0.000000 | |
| 203 | 1 | h | 0.117064 | 0.121139 | 0.999748 | -0.797060 | |
| 203 | 1 | j | 0.072857 | 0.097195 | 0.996786 | -1.327002 | |
| 203 | 1 | m | -0.097276 | -0.075291 | 0.996669 | -1.177638 | |
| 203 | 1 | n | -0.012827 | 0.007192 | 0.997692 | -1.284602 | |
| 203 | 2 | a | -0.042574 | -0.043710 | 0.999964 | 0.582901 | |
| 203 | 2 | b | 0.005796 | 0.005370 | 0.999995 | 0.574551 | |
| 203 | 2 | c | -0.037613 | -0.038575 | 0.999974 | 0.585132 | |
| 203 | 2 | d | -0.070321 | -0.047237 | 0.996690 | -1.238604 | |
| 203 | 2 | e | -0.001022 | -0.001022 | 1.000000 | 0.000000 | |
| 203 | 2 | f | -0.036263 | -0.019334 | 0.997846 | -1.124668 | |
| 203 | 2 | g | -0.070989 | -0.048683 | 0.996825 | -1.222133 | |
| 203 | 2 | h | 0.069005 | 0.071266 | 0.999344 | -0.931962 | |
| 203 | 2 | j | 0.034705 | 0.056862 | 0.996951 | -1.237896 | |
| 203 | 2 | i | 0.002329 | 0.002487 | 1.000000 | -1.196375 | |
| 203 | 2 | m | -0.044468 | -0.021596 | 0.996640 | -1.216922 | |
| 203 | 2 | n | 0.004985 | 0.023496 | 0.998056 | -1.294277 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## NOMINAL SUBSTITUTES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 207 | 1 | a | 0.089728 | 0.088733 | 0.999863 | 0.269908 | |
| 207 | 1 | d | -0.006064 | -0.015021 | 0.937702 | 0.590862 | |
| 207 | 1 | e | -0.000956 | -0.000956 | 1.000000 | 0.000000 | |
| 207 | 1 | h | 0.213822 | 0.213813 | 1.000000 | 0.959972 | |
| 207 | 1 | j | 0.168212 | 0.166324 | 0.999935 | 0.752712 | |
| 207 | 1 | m | 0.099118 | 0.094709 | 0.999233 | 0.505890 | |
| 207 | 1 | n | 0.064855 | 0.063781 | 0.999268 | 0.125732 | |
| 207 | 2 | a | 0.069602 | 0.068528 | 0.999717 | 0.202447 | |
| 207 | 2 | b | 0.054739 | 0.054262 | 0.999936 | 0.188977 | |
| 207 | 2 | c | 0.070263 | 0.069245 | 0.999769 | 0.212202 | |
| 207 | 2 | d | 0.021932 | 0.013465 | 0.998701 | 0.743144 | |
| 207 | 2 | e | -0.000956 | -0.000956 | 1.000000 | 0.000000 | |
| 207 | 2 | f | -0.040281 | -0.045760 | 0.999586 | 0.852672 | |
| 207 | 2 | g | 0.018805 | 0.010348 | 0.998827 | 0.780937 | |
| 207 | 2 | h | 0.202720 | 0.202736 | 1.000000 | -0.935803 | |
| 207 | 2 | j | 0.193024 | 0.192399 | 0.999987 | 0.565203 | |
| 207 | 2 | l | 0.175987 | 0.176003 | 1.000000 | -0.695023 | |
| 207 | 2 | m | 0.121846 | 0.118406 | 0.999763 | 0.711351 | |
| 207 | 2 | n | 0.098820 | 0.098040 | 0.999844 | 0.198758 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## NOMINAL SUBSTITUTES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 212 | 1 | a | -0.532393 | -0.534533 | 0.999965 | 1.423618 | |
| 212 | 1 | d | -0.630979 | -0.646427 | 0.998339 | 1.592860 | |
| 212 | 1 | e | -0.281644 | -0.326587 | 0.984881 | 1.317287 | |
| 212 | 1 | h | 0.089775 | 0.049367 | 0.978870 | 0.965636 | |
| 212 | 1 | j | -0.592539 | -0.616077 | 0.997809 | 1.982051 | (**** |
| 212 | 1 | m | -0.663788 | -0.677796 | 0.998814 | 1.732608 | |
| 212 | 1 | n | -0.701485 | -0.708855 | 0.999517 | 1.517207 | |
| 212 | 2 | a | -0.553674 | -0.556193 | 0.999956 | 1.510422 | |
| 212 | 2 | b | -0.536118 | -0.537247 | 0.999990 | 1.407011 | |
| 212 | 2 | c | -0.560078 | -0.562278 | 0.999967 | 1.525915 | |
| 212 | 2 | d | -0.683127 | -0.683279 | 0.997142 | 0.013529 | |
| 212 | 2 | e | -0.288411 | -0.320491 | 0.992082 | 1.299060 | |
| 212 | 2 | f | -0.681729 | -0.682627 | 0.996382 | 0.070769 | |
| 212 | 2 | g | -0.692679 | -0.692217 | 0.996861 | -0.039660 | |
| 212 | 2 | h | 0.055268 | 0.031040 | 0.992915 | 0.998164 | |
| 212 | 2 | j | -0.685346 | -0.689855 | 0.999186 | 0.741864 | |
| 212 | 2 | l | 0.004343 | 0.002371 | 0.999954 | 1.011592 | |
| 212 | 2 | m | -0.710908 | -0.710451 | 0.998167 | -0.052548 | |
| 212 | 2 | n | -0.731150 | -0.728244 | 0.999230 | -0.525755 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## NOMINAL SUBSTITUTES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 219 | 1 | a | -0.331415 | -0.331415 | 1.000000 | 0.000000 | |
| 219 | 1 | d | -0.431196 | -0.475251 | 0.995865 | 2.001406 | (**** |
| 219 | 1 | e | -0.001101 | -0.001101 | 1.000000 | 0.000000 | |
| 219 | 1 | h | -0.738016 | -0.753976 | 0.977907 | 0.454360 | |
| 219 | 1 | j | -0.671656 | -0.711427 | 0.994462 | 1.776276 | |
| 219 | 1 | m | -0.541866 | -0.581991 | 0.995766 | 1.877988 | |
| 219 | 1 | n | -0.562968 | -0.601222 | 0.996420 | 1.941727 | |
| 219 | 2 | a | -0.253123 | -0.253123 | 1.000000 | 0.000000 | |
| 219 | 2 | b | -0.223322 | -0.223322 | 1.000000 | 0.000000 | |
| 219 | 2 | c | -0.264359 | -0.264359 | 1.000000 | 0.000000 | |
| 219 | 2 | d | -0.395491 | -0.448579 | 0.993423 | 1.915945 | |
| 219 | 2 | e | -0.001101 | -0.001101 | 1.000000 | 0.000000 | |
| 219 | 2 | f | -0.380616 | -0.435879 | 0.992508 | 1.870053 | |
| 219 | 2 | g | -0.404803 | -0.458173 | 0.993070 | 1.884412 | |
| 219 | 2 | h | -0.769917 | -0.781529 | 0.978468 | 0.355104 | |
| 219 | 2 | j | -0.594641 | -0.640988 | 0.993603 | 1.823538 | |
| 219 | 2 | l | -0.616435 | -0.661934 | 0.985596 | 1.305042 | |
| 219 | 2 | m | -0.504693 | -0.553519 | 0.993948 | 1.889240 | |
| 219 | 2 | n | -0.520418 | -0.565979 | 0.995212 | 1.968895 | (**** |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## NOMINAL SUBSTITUTES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 221 | 1 | a | 0.044923 | 0.044756 | 0.999961 | 0.071199 | |
| 221 | 1 | d | 0.075409 | 0.062879 | 0.993247 | 0.404370 | |
| 221 | 1 | e | -0.000885 | -0.000885 | 1.000000 | 0.000000 | |
| 221 | 1 | h | -0.034912 | -0.041861 | 0.998636 | 0.498106 | |
| 221 | 1 | j | -0.072548 | -0.078011 | 0.994438 | 0.194354 | |
| 221 | 1 | m | 0.012463 | 0.000665 | 0.991223 | 0.333200 | |
| 221 | 1 | n | -0.082838 | -0.087382 | 0.993039 | 0.144611 | |
| 221 | 2 | a | 0.035569 | 0.035454 | 0.999933 | 0.037527 | |
| 221 | 2 | b | 0.024068 | 0.023727 | 0.999973 | 0.173684 | |
| 221 | 2 | c | 0.035314 | 0.035149 | 0.999942 | 0.057249 | |
| 221 | 2 | d | 0.040988 | 0.024147 | 0.987793 | 0.403540 | |
| 221 | 2 | e | -0.000885 | -0.000885 | 1.000000 | 0.000000 | |
| 221 | 2 | f | -0.003799 | -0.020278 | 0.989501 | 0.425594 | |
| 221 | 2 | g | 0.035177 | 0.017615 | 0.987358 | 0.413433 | |
| 221 | 2 | h | -0.034210 | -0.040280 | 0.998956 | 0.497367 | |
| 221 | 2 | j | -0.066140 | -0.076664 | 0.988966 | 0.265752 | |
| 221 | 2 | l | -0.001531 | -0.001697 | 0.999999 | 0.524866 | |
| 221 | 2 | m | -0.013498 | -0.028967 | 0.987979 | 0.373397 | |
| 221 | 2 | n | -0.092854 | -0.102614 | 0.990053 | 0.260147 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### NOMINAL SUBSTITUTES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 222 | 1 | a | -0.065303 | -0.065303 | 1.000000 | 0.000000 | |
| 222 | 1 | d | -0.407137 | -0.399368 | 0.992735 | -0.314716 | |
| 222 | 1 | e | -0.000884 | -0.000884 | 1.000000 | 0.000000 | |
| 222 | 1 | h | -0.182421 | -0.181549 | 0.999816 | -0.206736 | |
| 222 | 1 | j | -0.403934 | -0.402929 | 0.999621 | -0.178444 | |
| 222 | 1 | m | -0.430564 | -0.422595 | 0.992656 | -0.324801 | |
| 222 | 1 | n | -0.134080 | -0.173806 | 0.990370 | -0.664064 | |
| 222 | 2 | a | -0.076259 | -0.076259 | 1.000000 | 0.000000 | |
| 222 | 2 | b | -0.063133 | -0.063133 | 1.000000 | 0.000000 | |
| 222 | 2 | c | -0.073564 | -0.073564 | 1.000000 | 0.000000 | |
| 222 | 2 | d | -0.410846 | -0.409847 | 0.996592 | -0.059321 | |
| 222 | 2 | e | -0.000884 | -0.000864 | 1.000000 | 0.000000 | |
| 222 | 2 | f | -0.338840 | -0.337874 | 0.995228 | -0.046988 | |
| 222 | 2 | g | -0.410581 | -0.409606 | 0.996027 | -0.053649 | |
| 222 | 2 | h | -0.022308 | -0.022249 | 0.999999 | -0.223064 | |
| 222 | 2 | j | -0.430670 | -0.430466 | 0.997729 | -0.014989 | |
| 222 | 2 | l | -0.002454 | -0.002454 | 1.000000 | 0.000000 | |
| 222 | 2 | m | -0.442443 | -0.441810 | 0.995928 | -0.034932 | |
| 222 | 2 | n | -0.256865 | -0.234907 | 0.987643 | -0.643495 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### NOMINAL SUBSTITUTES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 223 | 1 | a | -0.732594 | -0.731242 | 0.999994 | -1.728851 | |
| 223 | 1 | d | -0.694873 | -0.688107 | 0.996236 | -0.400950 | |
| 223 | 1 | e | -0.000648 | -0.000648 | 1.000000 | 0.000000 | |
| 223 | 1 | h | -0.373036 | -0.373034 | 1.000000 | -0.333290 | |
| 223 | 1 | j | -0.422509 | -0.417174 | 0.999865 | -1.296866 | |
| 223 | 1 | m | -0.695676 | -0.674388 | 0.997288 | -1.344104 | |
| 223 | 1 | n | -0.639829 | -0.616235 | 0.997039 | -1.355832 | |
| 223 | 2 | a | -0.754136 | -0.752364 | 0.999987 | -1.630948 | |
| 223 | 2 | b | -0.718551 | -0.717670 | 0.999996 | -1.532998 | |
| 223 | 2 | c | -0.752835 | -0.751203 | 0.999989 | -1.633879 | |
| 223 | 2 | d | -0.732325 | -0.731320 | 0.999396 | -0.158490 | |
| 223 | 2 | e | -0.000648 | -0.000648 | 1.000000 | 0.000000 | |
| 223 | 2 | f | -0.709220 | -0.708283 | 0.999766 | -0.229166 | |
| 223 | 2 | g | -0.731842 | -0.730878 | 0.999493 | -0.165860 | |
| 223 | 2 | h | -0.361158 | -0.361080 | 1.000000 | -0.440584 | |
| 223 | 2 | j | -0.389875 | -0.387820 | 0.999958 | -0.896217 | |
| 223 | 2 | l | -0.315803 | -0.315761 | 1.000000 | -0.647434 | |
| 223 | 2 | m | -0.726692 | -0.719852 | 0.999597 | -1.196002 | |
| 223 | 2 | n | -0.670259 | -0.662359 | 0.999485 | -1.154575 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### NOMINAL SUBSTITUTES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 227 | 1 | a | -0.128573 | -0.128573 | 1.000000 | 0.000000 | |
| 227 | 1 | d | -0.321199 | -0.351401 | 0.940715 | 0.416855 | |
| 227 | 1 | e | -0.000658 | -0.000658 | 1.000000 | 0.000000 | |
| 227 | 1 | h | 0.333390 | 0.338163 | 0.990107 | -0.161140 | |
| 227 | 1 | j | 0.059223 | 0.019964 | 0.945642 | 0.533209 | |
| 227 | 1 | m | -0.227812 | -0.253677 | 0.927851 | 0.314029 | |
| 227 | 1 | n | -0.061523 | -0.077847 | 0.928269 | 0.193250 | |
| 227 | 2 | a | -0.122705 | -0.122705 | 1.000000 | 0.000000 | |
| 227 | 2 | b | -0.133699 | -0.133699 | 1.000000 | 0.000000 | |
| 227 | 2 | c | -0.126353 | -0.126353 | 1.000000 | 0.000000 | |
| 227 | 2 | d | -0.288205 | -0.285871 | 0.950694 | -0.034733 | |
| 227 | 2 | e | -0.000658 | -0.000658 | 1.000000 | 0.000000 | |
| 227 | 2 | f | -0.282278 | -0.255137 | 0.948825 | -0.394053 | |
| 227 | 2 | g | -0.290104 | -0.280970 | 0.947762 | -0.132004 | |
| 227 | 2 | h | 0.331148 | 0.336708 | 0.997306 | -0.359012 | |
| 227 | 2 | j | 0.023736 | 0.000551 | 0.954392 | 0.343405 | |
| 227 | 2 | l | 0.037912 | 0.094723 | 0.985467 | -1.494170 | |
| 227 | 2 | m | -0.214012 | -0.211916 | 0.939348 | -0.027571 | |
| 227 | 2 | n | -0.066552 | -0.070422 | 0.933953 | 0.047729 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

### A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### NOMINAL SUBSTITUTES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 230 | 1 | a | -0.373570 | -0.373328 | 0.999999 | -0.982605 | |
| 230 | 1 | d | -0.251948 | -0.251866 | 0.935136 | -0.001026 | |
| 230 | 1 | e | -0.000600 | -0.000600 | 1.000000 | 0.000000 | |
| 230 | 1 | h | 0.076769 | 0.077018 | 0.999997 | -0.423936 | |
| 230 | 1 | j | 0.058008 | 0.054187 | 0.996789 | 0.208135 | |
| 230 | 1 | m | -0.102239 | -0.112390 | 0.968626 | 0.177683 | |
| 230 | 1 | n | -0.169797 | -0.175705 | 0.967702 | 0.102896 | |
| 230 | 2 | a | -0.305620 | -0.305273 | 0.999999 | -1.108923 | |
| 230 | 2 | b | -0.234657 | -0.234507 | 1.000000 | -1.228204 | |
| 230 | 2 | c | -0.301274 | -0.300957 | 0.999999 | -1.117145 | |
| 230 | 2 | d | -0.197532 | -0.207270 | 0.930252 | 0.116136 | |
| 230 | 2 | e | -0.000600 | -0.000600 | 1.000000 | 0.000000 | |
| 230 | 2 | f | -0.149564 | -0.162809 | 0.941879 | 0.171498 | |
| 230 | 2 | g | -0.196159 | -0.205976 | 0.925394 | 0.113172 | |
| 230 | 2 | h | 0.064555 | 0.064911 | 0.999999 | -1.178203 | |
| 230 | 2 | j | 0.074391 | 0.069176 | 0.995794 | 0.248452 | |
| 230 | 2 | l | 0.073664 | 0.073596 | 0.999999 | 0.183226 | |
| 230 | 2 | m | -0.075132 | -0.089965 | 0.949348 | 0.203868 | |
| 230 | 2 | n | -0.137167 | -0.148929 | 0.945605 | 0.157109 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## NOMINAL SUBSTITUTES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 235 | 1 | a | -0.031123 | -0.031123 | 1.000000 | 0.000000 | |
| 235 | 1 | d | -0.329375 | -0.393828 | 0.989697 | 1.959819 | |
| 235 | 1 | e | -0.000931 | -0.000931 | 1.000000 | 0.000000 | |
| 235 | 1 | h | -0.094045 | -0.104226 | 0.989185 | 0.295166 | |
| 235 | 1 | j | -0.506407 | -0.574452 | 0.983211 | 1.736605 | |
| 235 | 1 | m | -0.397157 | -0.467259 | 0.986296 | 1.884332 | |
| 235 | 1 | n | -0.457890 | -0.525953 | 0.984831 | 1.783855 | |
| 235 | 2 | a | -0.160684 | -0.160684 | 1.000000 | 0.000000 | |
| 235 | 2 | b | -0.226216 | -0.226216 | 1.000000 | 0.000000 | |
| 235 | 2 | c | -0.155708 | -0.155708 | 1.000000 | 0.000000 | |
| 235 | 2 | d | -0.361740 | -0.420046 | 0.989110 | 1.751795 | |
| 235 | 2 | e | -0.000931 | -0.000931 | 1.000000 | 0.000000 | |
| 235 | 2 | f | -0.412523 | -0.475978 | 0.984102 | 1.615723 | |
| 235 | 2 | g | -0.362648 | -0.421563 | 0.988388 | 1.717625 | |
| 235 | 2 | h | -0.126989 | -0.142522 | 0.998556 | 1.234739 | |
| 235 | 2 | j | -0.453489 | -0.519651 | 0.983442 | 1.671045 | |
| 235 | 2 | l | -0.014128 | -0.015829 | 0.999985 | 1.316555 | |
| 235 | 2 | m | -0.403257 | -0.467173 | 0.986074 | 1.722661 | |
| 235 | 2 | n | -0.434261 | -0.495595 | 0.985837 | 1.661679 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## NOMINAL SUBSTITUTES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 248 | 1 | a | -0.174181 | -0.171062 | 0.999898 | -0.990842 | |
| 248 | 1 | d | -0.376824 | -0.440045 | 0.965948 | 1.170448 | |
| 248 | 1 | e | -0.001000 | -0.001000 | 1.000000 | 0.000000 | |
| 248 | 1 | h | -0.209710 | -0.209766 | 1.000000 | 0.926858 | |
| 248 | 1 | j | -0.240205 | -0.258084 | 0.998240 | 1.379506 | |
| 248 | 1 | m | -0.384595 | -0.429285 | 0.982199 | 1.132802 | |
| 248 | 1 | n | -0.315971 | -0.365961 | 0.985698 | 1.384493 | |
| 248 | 2 | a | -0.162555 | -0.158754 | 0.999855 | -1.010935 | |
| 248 | 2 | b | -0.162328 | -0.160639 | 0.999969 | -0.978255 | |
| 248 | 2 | c | -0.165652 | -0.162231 | 0.999882 | -1.006056 | |
| 248 | 2 | d | -0.388644 | -0.436862 | 0.957483 | 0.807662 | |
| 248 | 2 | e | -0.001000 | -0.001000 | 1.000000 | 0.000000 | |
| 248 | 2 | f | -0.387811 | -0.438841 | 0.953213 | 0.815199 | |
| 248 | 2 | g | -0.385112 | -0.432598 | 0.954699 | 0.769845 | |
| 248 | 2 | h | -0.209574 | -0.209617 | 1.000000 | 0.913745 | |
| 248 | 2 | j | -0.253679 | -0.267125 | 0.998534 | 1.142641 | |
| 248 | 2 | i | -0.206419 | -0.206457 | 1.000000 | 0.483405 | |
| 248 | 2 | m | -0.426066 | -0.454715 | 0.975104 | 0.636954 | |
| 248 | 2 | n | -0.348954 | -0.385543 | 0.982370 | 0.929850 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## NOMINAL SUBSTITUTES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 252 | 1 | a | 0.087821 | 0.087821 | 1.000000 | 0.000000 | |
| 252 | 1 | d | 0.146321 | 0.170472 | 0.997623 | -1.498251 | |
| 252 | 1 | e | -0.000931 | -0.000931 | 1.000000 | 0.000000 | |
| 252 | 1 | h | 0.187661 | 0.192869 | 0.997087 | -0.294817 | |
| 252 | 1 | j | 0.209856 | 0.243429 | 0.991116 | -1.092112 | |
| 252 | 1 | m | 0.200105 | 0.224950 | 0.996364 | -1.257715 | |
| 252 | 1 | n | 0.253456 | 0.267481 | 0.996404 | -0.724663 | |
| 252 | 2 | a | 0.006594 | 0.006594 | 1.000000 | 0.000000 | |
| 252 | 2 | b | -0.029094 | -0.029094 | 1.000000 | 0.000000 | |
| 252 | 2 | c | 0.009133 | 0.009133 | 1.000000 | 0.000000 | |
| 252 | 2 | d | 0.188045 | 0.204110 | 0.996135 | -0.789158 | |
| 252 | 2 | e | -0.000931 | -0.000931 | 1.000000 | 0.000000 | |
| 252 | 2 | f | 0.095067 | 0.108899 | 0.993730 | -0.526705 | |
| 252 | 2 | g | 0.196328 | 0.211898 | 0.995575 | -0.716091 | |
| 252 | 2 | h | 0.024025 | 0.025382 | 0.999952 | -0.585217 | |
| 252 | 2 | j | 0.244992 | 0.260262 | 0.995688 | -0.719136 | |
| 252 | 2 | i | 0.000861 | 0.000966 | 1.000000 | -0.513527 | |
| 252 | 2 | m | 0.248129 | 0.261814 | 0.995253 | -0.615062 | |
| 252 | 2 | n | 0.295229 | 0.301217 | 0.995104 | -0.268839 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

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Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## PRO-VERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 203 | 1 | a | -0.105343 | -0.106373 | 0.999971 | 0.590049 | |
| 203 | 1 | d | -0.141626 | -0.140762 | 0.999953 | -0.394116 | |
| 203 | 1 | e | -0.001022 | -0.001022 | 1.000000 | 0.000000 | |
| 203 | 1 | h | 0.117064 | 0.117082 | 1.000000 | -1.013372 | |
| 203 | 1 | j | 0.072857 | 0.074912 | 0.999952 | -0.919138 | |
| 203 | 1 | m | -0.097276 | -0.095974 | 0.999947 | -0.555197 | |
| 203 | 1 | n | -0.012827 | -0.010821 | 0.999942 | -0.808327 | |
| 203 | 2 | a | -0.042574 | -0.043888 | 0.999949 | 0.565778 | |
| 203 | 2 | b | 0.005796 | 0.005309 | 0.999993 | 0.554977 | |
| 203 | 2 | c | -0.037613 | -0.038727 | 0.999963 | 0.568352 | |
| 203 | 2 | d | -0.070321 | -0.070567 | 0.999974 | 0.148748 | |
| 203 | 2 | e | -0.001022 | -0.001022 | 1.000000 | 0.000000 | |
| 203 | 2 | f | -0.036263 | -0.036419 | 0.999995 | 0.224800 | |
| 203 | 2 | g | -0.070989 | -0.071214 | 0.999979 | 0.153097 | |
| 203 | 2 | h | 0.069005 | 0.069169 | 1.000000 | -1.007216 | |
| 203 | 2 | j | 0.034705 | 0.035171 | 0.999979 | -0.313427 | |
| 203 | 2 | l | 0.002329 | 0.002420 | 1.000000 | -0.998119 | |
| 203 | 2 | m | -0.044468 | -0.044404 | 0.999976 | -0.040565 | |
| 203 | 2 | n | 0.004985 | 0.005557 | 0.599975 | -0.352308 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### PRO-VERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 207 | 1 | a | 0.089728 | 0.088733 | 0.999863 | 0.269908 | |
| 207 | 1 | d | -0.006064 | -0.007045 | 0.999902 | 0.312993 | |
| 207 | 1 | e | -0.000956 | -0.000956 | 1.000000 | 0.000000 | |
| 207 | 1 | h | 0.213822 | 0.213822 | 1.000000 | 0.000000 | |
| 207 | 1 | j | 0.168212 | 0.168215 | 1.000000 | -0.016288 | |
| 207 | 1 | m | 0.099118 | 0.099005 | 0.999977 | 0.075470 | |
| 207 | 1 | n | 0.064855 | 0.065020 | 0.999980 | -0.115978 | |
| 207 | 2 | a | 0.069602 | 0.068528 | 0.999717 | 0.202447 | |
| 207 | 2 | b | 0.054739 | 0.054262 | 0.999936 | 0.188977 | |
| 207 | 2 | c | 0.070263 | 0.069245 | 0.999769 | 0.212202 | |
| 207 | 2 | d | 0.021932 | 0.022143 | 0.999743 | -0.041548 | |
| 207 | 2 | e | -0.000956 | -0.000956 | 1.000000 | 0.000000 | |
| 207 | 2 | f | -0.040281 | -0.041326 | 0.999955 | 0.491185 | |
| 207 | 2 | g | 0.018805 | 0.018842 | 0.999799 | -0.008286 | |
| 207 | 2 | h | 0.202720 | 0.202736 | 1.000000 | -1.053751 | |
| 207 | 2 | j | 0.193024 | 0.193329 | 0.999997 | -0.597415 | |
| 207 | 2 | l | 0.175987 | 0.176003 | 1.000000 | -0.695023 | |
| 207 | 2 | m | 0.121846 | 0.122559 | 0.999958 | -0.350778 | |
| 207 | 2 | n | 0.098820 | 0.100521 | 0.999972 | -1.017328 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### PRO-VERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 212 | 1 | a | -0.532393 | -0.533515 | 0.999961 | 0.726140 | |
| 212 | 1 | d | -0.630979 | -0.641000 | 0.998405 | 1.092061 | |
| 212 | 1 | e | -0.281644 | -0.327318 | 0.984898 | 1.339204 | |
| 212 | 1 | h | 0.089775 | 0.089767 | 1.000000 | 0.305103 | |
| 212 | 1 | j | -0.592539 | -0.597680 | 0.999279 | 0.813148 | |
| 212 | 1 | m | -0.663788 | -0.670554 | 0.998968 | 0.954455 | |
| 212 | 1 | n | -0.701485 | -0.702827 | 0.999617 | 0.332593 | |
| 212 | 2 | a | -0.553674 | -0.554955 | 0.999949 | 0.738458 | |
| 212 | 2 | b | -0.536118 | -0.536919 | 0.999989 | 0.980276 | |
| 212 | 2 | c | -0.560078 | -0.561285 | 0.999962 | 0.807735 | |
| 212 | 2 | d | -0.683127 | -0.690872 | 0.998363 | 0.891347 | |
| 212 | 2 | e | -0.288411 | -0.320948 | 0.992084 | 1.317437 | |
| 212 | 2 | f | -0.681729 | -0.691854 | 0.998815 | 1.327136 | |
| 212 | 2 | g | -0.692679 | -0.700712 | 0.998380 | 0.938043 | |
| 212 | 2 | h | 0.055268 | 0.054862 | 0.999998 | 1.143936 | |
| 212 | 2 | j | -0.685346 | -0.690524 | 0.999308 | 0.916263 | |
| 212 | 2 | l | 0.004343 | 0.004343 | 1.000000 | 0.000000 | |
| 212 | 2 | m | -0.710908 | -0.716524 | 0.999002 | 0.858428 | |
| 212 | 2 | n | -0.731150 | -0.732718 | 0.999761 | 0.511488 | |

**NOTES:**

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### PRO-VERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 219 | 1 | a | -0.331415 | -0.331558 | 0.999999 | 0.428381 | |
| 219 | 1 | d | -0.431196 | -0.430929 | 0.999993 | -0.317224 | |
| 219 | 1 | e | -0.001101 | -0.001101 | 1.000000 | 0.000000 | |
| 219 | 1 | h | -0.738016 | -0.738106 | 0.999999 | 0.491606 | |
| 219 | 1 | j | -0.671656 | -0.671557 | 0.999995 | -0.176292 | |
| 219 | 1 | m | -0.541866 | -0.541748 | 0.999985 | -0.102544 | |
| 219 | 1 | n | -0.562968 | -0.562841 | 0.999981 | -0.098643 | |
| 219 | 2 | a | -0.253123 | -0.253282 | 0.999997 | 0.290265 | |
| 219 | 2 | b | -0.223322 | -0.223384 | 0.999999 | 0.222491 | |
| 219 | 2 | c | -0.264359 | -0.264516 | 0.999998 | 0.312450 | |
| 219 | 2 | d | -0.395491 | -0.395332 | 0.999997 | -0.307938 | |
| 219 | 2 | e | -0.001101 | -0.001101 | 1.000000 | 0.000000 | |
| 219 | 2 | f | -0.380616 | -0.380539 | 0.999999 | -0.283615 | |
| 219 | 2 | g | -0.404803 | -0.404651 | 0.999998 | -0.313673 | |
| 219 | 2 | h | -0.769917 | -0.770058 | 0.999996 | 0.327318 | |
| 219 | 2 | j | -0.594641 | -0.594619 | 0.999993 | -0.029247 | |
| 219 | 2 | l | -0.616435 | -0.616571 | 0.999998 | 0.375072 | |
| 219 | 2 | m | -0.504693 | -0.504606 | 0.999995 | -0.128464 | |
| 219 | 2 | n | -0.520418 | -0.520337 | 0.999995 | -0.119573 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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Page

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### PRO-VERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 221 | 1 | a | 0.044923 | 0.044756 | 0.999961 | 0.071199 | |
| 221 | 1 | d | 0.075409 | 0.068418 | 0.999671 | 1.021262 | |
| 221 | 1 | e | -0.000885 | -0.000885 | 1.000000 | 0.000000 | |
| 221 | 1 | h | -0.034912 | -0.034912 | 1.000000 | 0.000000 | |
| 221 | 1 | j | -0.072548 | -0.078012 | 0.999855 | 1.204255 | |
| 221 | 1 | m | 0.012463 | 0.006072 | 0.999766 | 1.105415 | |
| 221 | 1 | n | -0.082838 | -0.085460 | 0.999962 | 1.131846 | |
| 221 | 2 | a | 0.035569 | 0.035454 | 0.999933 | 0.037527 | |
| 221 | 2 | b | 0.024068 | 0.023727 | 0.999973 | 0.173684 | |
| 221 | 2 | c | 0.035314 | 0.035149 | 0.999942 | 0.057249 | |
| 221 | 2 | d | 0.040988 | 0.039240 | 0.999922 | 0.524472 | |
| 221 | 2 | e | -0.000885 | -0.000885 | 1.000000 | 0.000000 | |
| 221 | 2 | f | -0.003799 | -0.004296 | 0.999986 | 0.347925 | |
| 221 | 2 | g | 0.035177 | 0.033652 | 0.999936 | 0.505707 | |
| 221 | 2 | h | -0.034210 | -0.034210 | 1.000000 | 0.000000 | |
| 221 | 2 | j | -0.066140 | -0.067458 | 0.999979 | 0.754856 | |
| 221 | 2 | l | -0.001531 | -0.001531 | 1.000000 | 0.000000 | |
| 221 | 2 | m | -0.013498 | -0.014859 | 0.999966 | 0.617133 | |
| 221 | 2 | n | -0.092854 | -0.093602 | 0.999993 | 0.738241 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### PRO-VERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 227 | 1 | a | -0.128573 | -0.126934 | 0.999988 | -1.509196 | |
| 227 | 1 | d | -0.321199 | -0.397123 | 0.974491 | 1.576458 | |
| 227 | 1 | e | -0.000658 | -0.000658 | 1.000000 | 0.000000 | |
| 227 | 1 | h | 0.333390 | 0.337955 | 0.990110 | -0.154117 | |
| 227 | 1 | j | 0.059223 | 0.019363 | 0.992820 | 1.489250 | |
| 227 | 1 | m | -0.227812 | -0.300248 | 0.976206 | 1.524571 | |
| 227 | 1 | n | -0.061523 | -0.123219 | 0.980781 | 1.413555 | |
| 227 | 2 | a | -0.122705 | -0.120630 | 0.999981 | -1.499219 | |
| 227 | 2 | b | -0.133699 | -0.132765 | 0.999996 | -1.489035 | |
| 227 | 2 | c | -0.126353 | -0.124485 | 0.999984 | -1.497910 | |
| 227 | 2 | d | -0.288205 | -0.354105 | 0.980924 | 1.566304 | |
| 227 | 2 | e | -0.000658 | -0.000658 | 1.000000 | 0.000000 | |
| 227 | 2 | f | -0.282278 | -0.338312 | 0.982229 | 1.381232 | |
| 227 | 2 | g | -0.290104 | -0.356231 | 0.980555 | 1.557834 | |
| 227 | 2 | h | 0.331148 | 0.336407 | 0.997310 | -0.339819 | |
| 227 | 2 | j | 0.023736 | -0.019330 | 0.991257 | 1.457485 | |
| 227 | 2 | l | 0.037912 | 0.094589 | 0.985453 | -1.489917 | |
| 227 | 2 | m | -0.214012 | -0.277478 | 0.980964 | 1.488277 | |
| 227 | 2 | n | -0.066552 | -0.125085 | 0.982356 | 1.399863 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### PRO-VERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 230 | 1 | a | -0.373570 | -0.373570 | 1.000000 | 0.000000 | |
| 230 | 1 | d | -0.251948 | -0.251948 | 1.000000 | 0.000000 | |
| 230 | 1 | e | -0.000600 | -0.000600 | 1.000000 | 0.000000 | |
| 230 | 1 | h | 0.076769 | 0.076769 | 1.000000 | 0.000000 | |
| 230 | 1 | j | 0.058008 | 0.058008 | 1.000000 | 0.000000 | |
| 230 | 1 | m | -0.102239 | -0.102239 | 1.000000 | 0.000000 | |
| 230 | 1 | n | -0.169797 | -0.169797 | 1.000000 | 0.000000 | |
| 230 | 2 | a | -0.305620 | -0.305620 | 1.000000 | 0.000000 | |
| 230 | 2 | b | -0.234657 | -0.234657 | 1.000000 | 0.000000 | |
| 230 | 2 | c | -0.301274 | -0.301274 | 1.000000 | 0.000000 | |
| 230 | 2 | d | -0.197532 | -0.197532 | 1.000000 | 0.000000 | |
| 230 | 2 | e | -0.000600 | -0.000600 | 1.000000 | 0.000000 | |
| 230 | 2 | f | -0.149564 | -0.149564 | 1.000000 | 0.000000 | |
| 230 | 2 | g | -0.196159 | -0.196159 | 1.000000 | 0.000000 | |
| 230 | 2 | h | 0.064555 | 0.064555 | 1.000000 | 0.000000 | |
| 230 | 2 | j | 0.074391 | 0.074391 | 1.000000 | 0.000000 | |
| 230 | 2 | i | 0.073664 | 0.073664 | 1.000000 | 0.000000 | |
| 230 | 2 | m | -0.075132 | -0.075132 | 1.000000 | 0.000000 | |
| 230 | 2 | n | -0.137167 | -0.137166 | 1.000000 | -0.468735 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### PRO-VERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 235 | 1 | a | -0.031123 | -0.029072 | 0.999980 | -1.384357 | |
| 235 | 1 | d | -0.329375 | -0.329837 | 0.999961 | 0.235258 | |
| 235 | 1 | e | -0.000931 | -0.000931 | 1.000000 | 0.000000 | |
| 235 | 1 | h | -0.094045 | -0.094042 | 1.000000 | -0.219935 | |
| 235 | 1 | j | -0.506407 | -0.505755 | 0.999331 | -0.271898 | |
| 235 | 1 | m | -0.397157 | -0.396960 | 0.999949 | -0.090133 | |
| 235 | 1 | n | -0.457890 | -0.456801 | 0.999928 | -0.432790 | |
| 235 | 2 | a | -0.160684 | -0.157446 | 0.999947 | -1.343212 | |
| 235 | 2 | b | -0.226216 | -0.224573 | 0.999986 | -1.320368 | |
| 235 | 2 | c | -0.155708 | -0.152832 | 0.999958 | -1.342845 | |
| 235 | 2 | d | -0.361740 | -0.361667 | 0.999977 | -0.049459 | |
| 235 | 2 | e | -0.000931 | -0.000931 | 1.000000 | 0.000000 | |
| 235 | 2 | f | -0.412523 | -0.412476 | 0.999993 | -0.056523 | |
| 235 | 2 | g | -0.362648 | -0.362592 | 0.999981 | -0.041941 | |
| 235 | 2 | h | -0.126989 | -0.126878 | 1.000000 | -0.649706 | |
| 235 | 2 | j | -0.453489 | -0.453002 | 0.999974 | -0.321988 | |
| 235 | 2 | l | -0.014128 | -0.014068 | 1.000000 | -0.641533 | |
| 235 | 2 | m | -0.403257 | -0.402959 | 0.999978 | -0.208961 | |
| 235 | 2 | n | -0.434261 | -0.433667 | 0.999974 | -0.336604 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### PRO-VERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 248 | 1 | a | -0.174181 | -0.171062 | 0.999898 | -0.990842 | |
| 248 | 1 | d | -0.376824 | -0.401778 | 0.995723 | 1.285642 | |
| 248 | 1 | e | -0.001000 | -0.001000 | 1.000000 | 0.000000 | |
| 248 | 1 | h | -0.209710 | -0.209715 | 1.000000 | 1.908137 | |
| 248 | 1 | j | -0.240205 | -0.244108 | 0.999876 | 1.136981 | |
| 248 | 1 | m | -0.384995 | -0.400380 | 0.998027 | 1.172069 | |
| 248 | 1 | n | -0.315971 | -0.330202 | 0.998450 | 1.194390 | |
| 248 | 2 | a | -0.162555 | -0.158754 | 0.999855 | -1.010935 | |
| 248 | 2 | b | -0.162328 | -0.160639 | 0.999969 | -0.978255 | |
| 248 | 2 | c | -0.165652 | -0.162231 | 0.999882 | -1.006056 | |
| 248 | 2 | d | -0.388644 | -0.410135 | 0.997319 | 1.398259 | |
| 248 | 2 | e | -0.001000 | -0.001000 | 1.000000 | 0.000000 | |
| 248 | 2 | f | -0.387811 | -0.408083 | 0.998418 | 1.696249 | |
| 248 | 2 | g | -0.385112 | -0.407324 | 0.997400 | 1.462456 | |
| 248 | 2 | h | -0.209574 | -0.209576 | 1.000000 | 0.653858 | |
| 248 | 2 | j | -0.253679 | -0.255578 | 0.999934 | 0.764880 | |
| 246 | 2 | l | -0.206419 | -0.206449 | 1.000000 | 1.938001 | |
| 248 | 2 | m | -0.426066 | -0.440730 | 0.998495 | 1.234952 | |
| 248 | 2 | n | -0.348954 | -0.360402 | 0.998800 | 1.104669 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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Page

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## PRO-VERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 252 | 1 | a | 0.087821 | 0.082385 | 0.999928 | 1.929748 | |
| 252 | 1 | d | 0.146321 | 0.155483 | 0.997488 | -0.554456 | |
| 252 | 1 | e | -0.000931 | -0.000931 | 1.000000 | 0.000000 | |
| 252 | 1 | h | 0.187661 | 0.191518 | 0.998958 | -0.364343 | |
| 252 | 1 | j | 0.209856 | 0.222480 | 0.994604 | -0.527554 | |
| 252 | 1 | m | 0.200105 | 0.207138 | 0.998657 | -0.587296 | |
| 252 | 1 | n | 0.253456 | 0.256671 | 0.999716 | -0.590400 | |
| 252 | 2 | a | 0.006594 | -0.000371 | 0.999896 | 2.045190 | (**** |
| 252 | 2 | b | -0.029094 | -0.032597 | 0.999974 | 2.072719 | (**** |
| 252 | 2 | c | 0.009133 | 0.002802 | 0.999913 | 2.039117 | (**** |
| 252 | 2 | d | 0.188045 | 0.176063 | 0.998716 | 1.017375 | |
| 252 | 2 | e | -0.000931 | -0.000931 | 1.000000 | 0.000000 | |
| 252 | 2 | f | 0.095067 | 0.076337 | 0.998618 | 1.514992 | |
| 252 | 2 | g | 0.196328 | 0.182969 | 0.998639 | 1.102349 | |
| 252 | 2 | h | 0.024025 | 0.024478 | 0.999987 | -0.375015 | |
| 252 | 2 | j | 0.244992 | 0.242255 | 0.999147 | 0.289747 | |
| 252 | 2 | l | 0.000861 | 0.000896 | 1.000000 | -0.374171 | |
| 252 | 2 | m | 0.248129 | 0.240101 | 0.999234 | 0.894038 | |
| 252 | 2 | n | 0.295229 | 0.293866 | 0.999794 | 0.297747 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### PRO-VERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 222 | 1 | a | -0.065303 | -0.065303 | 1.000000 | 0.000000 | |
| 222 | 1 | d | -0.407137 | -0.407137 | 1.000000 | 0.000000 | |
| 222 | 1 | e | -0.000884 | -0.000884 | 1.000000 | 0.000000 | |
| 222 | 1 | h | -0.182421 | -0.182421 | 1.000000 | 0.000000 | |
| 222 | 1 | j | -0.403934 | -0.403934 | 1.000000 | 0.000000 | |
| 222 | 1 | m | -0.430564 | -0.430564 | 1.000000 | 0.000000 | |
| 222 | 1 | n | -0.194080 | -0.194080 | 1.000000 | 0.000000 | |
| 222 | 2 | a | -0.076259 | -0.076259 | 1.000000 | 0.000000 | |
| 222 | 2 | b | -0.063133 | -0.063133 | 1.000000 | 0.000000 | |
| 222 | 2 | c | -0.073564 | -0.073564 | 1.000000 | 0.000000 | |
| 222 | 2 | d | -0.410846 | -0.410846 | 1.000000 | 0.000000 | |
| 222 | 2 | e | -0.000884 | -0.000884 | 1.000000 | 0.000000 | |
| 222 | 2 | f | -0.338840 | -0.338840 | 1.000000 | 0.000000 | |
| 222 | 2 | g | -0.410581 | -0.410581 | 1.000000 | 0.000000 | |
| 222 | 2 | h | -0.022308 | -0.022308 | 1.000000 | 0.000000 | |
| 222 | 2 | j | -0.430670 | -0.430670 | 1.000000 | 0.000000 | |
| 222 | 2 | l | -0.002454 | -0.002454 | 1.000000 | 0.000000 | |
| 222 | 2 | m | -0.442443 | -0.442443 | 1.000000 | 0.000000 | |
| 222 | 2 | n | -0.256865 | -0.256865 | 1.000000 | 0.000000 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## PRO-VERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 223 | 1 | a | -0.732594 | -0.732594 | 1.000000 | 0.000000 | |
| 223 | 1 | c | -0.694873 | -0.694873 | 1.000000 | 0.000000 | |
| 223 | 1 | e | -0.000648 | -0.000648 | 1.000000 | 0.000000 | |
| 223 | 1 | h | -0.373036 | -0.373036 | 1.000000 | 0.000000 | |
| 223 | 1 | j | -0.422509 | -0.422509 | 1.000000 | 0.000000 | |
| 223 | 1 | m | -0.695676 | -0.695676 | 1.000000 | 0.000000 | |
| 223 | 1 | n | -0.639829 | -0.639829 | 1.000000 | 0.159475 | |
| 223 | 2 | a | -0.754136 | -0.754136 | 1.000000 | 0.000000 | |
| 223 | 2 | b | -0.718551 | -0.718551 | 1.000000 | 0.000000 | |
| 223 | 2 | c | -0.752835 | -0.752835 | 1.000000 | 0.000000 | |
| 223 | 2 | d | -0.732325 | -0.732325 | 1.000000 | 0.000000 | |
| 223 | 2 | e | -0.000648 | -0.000648 | 1.000000 | 0.000000 | |
| 223 | 2 | f | -0.709220 | -0.709220 | 1.000000 | 0.000000 | |
| 223 | 2 | g | -0.731842 | -0.731842 | 1.000000 | 0.000000 | |
| 223 | 2 | h | -0.361158 | -0.361158 | 1.000000 | 0.000000 | |
| 223 | 2 | j | -0.389875 | -0.389875 | 1.000000 | 0.000000 | |
| 223 | 2 | l | -0.315803 | -0.315803 | 1.000000 | 0.000000 | |
| 223 | 2 | m | -0.726692 | -0.726692 | 1.000000 | 0.000000 | |
| 223 | 2 | n | -0.670259 | -0.670259 | 1.000000 | 0.000000 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

A Statistical Comparison of the Rclationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

INDEFINITES

|  |  |  | Correlation Coefficients |  |  | Significance Level |  |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 203 | 1 | a | -0.105343 | -0.106148 | 0.999980 | 0.553864 |  |
| 203 | 1 | d | -0.141626 | -0.166041 | 0.997118 | 1.413574 |  |
| 203 | 1 | e | -0.001022 | -0.001022 | 1.000000 | 0.000000 |  |
| 203 | 1 | h | 0.117064 | 0.091571 | 0.996747 | 1.383275 |  |
| 203 | 1 | j | 0.072857 | 0.060607 | 0.995188 | 0.545502 |  |
| 203 | 1 | m | -0.097276 | -0.129761 | 0.995824 | 1.556263 |  |
| 203 | 1 | n | -0.012827 | -0.055432 | 0.992866 | 1.556380 |  |
| 203 | 2 | a | -0.042574 | -0.043710 | 0.999964 | 0.582901 |  |
| 203 | 2 | b | 0.005796 | 0.005370 | 0.999995 | 0.574551 |  |
| 203 | 2 | c | -0.037613 | -0.038579 | 0.999974 | 0.585132 |  |
| 203 | 2 | d | -0.070321 | -0.098771 | 0.997359 | 1.710038 |  |
| 203 | 2 | e | -0.001022 | -0.001022 | 1.000000 | 0.000000 |  |
| 203 | 2 | f | -0.036263 | -0.064278 | 0.997835 | 1.857482 |  |
| 203 | 2 | g | -0.070989 | -0.100535 | 0.997272 | 1.747608 |  |
| 203 | 2 | h | 0.069005 | 0.056681 | 0.999148 | 1.303391 |  |
| 203 | 2 | j | 0.034705 | 0.004534 | 0.996455 | 1.562676 |  |
| 203 | 2 | l | 0.002329 | 0.001703 | 0.999998 | 1.358524 |  |
| 203 | 2 | m | -0.044468 | -0.080896 | 0.996097 | 1.799743 |  |
| 203 | 2 | n | 0.004985 | -0.039334 | 0.993294 | 1.669367 |  |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## INDEFINITES

|  |  |  | Correlation Coefficients |  |  | Significance Level |  |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 207 | 1 | a | 0.089728 | 0.088733 | 0.999863 | 0.269908 |  |
| 207 | 1 | d | -0.006064 | -0.033285 | 0.991321 | 0.924409 |  |
| 207 | 1 | e | -0.000956 | -0.000956 | 1.000000 | 0.000000 |  |
| 207 | 1 | h | 0.213822 | 0.207121 | 0.999440 | 0.913915 |  |
| 207 | 1 | j | 0.168212 | 0.172674 | 0.999604 | -0.718631 |  |
| 207 | 1 | m | 0.095118 | 0.078880 | 0.996789 | 1.133186 |  |
| 207 | 1 | n | 0.064855 | 0.041633 | 0.997764 | 1.554612 |  |
| 207 | 2 | a | 0.069602 | 0.068528 | 0.999717 | 0.202447 |  |
| 207 | 2 | b | 0.054739 | 0.054262 | 0.999936 | 0.188977 |  |
| 207 | 2 | c | 0.070263 | 0.069245 | 0.999769 | 0.212202 |  |
| 207 | 2 | d | 0.021932 | -0.000574 | 0.995388 | 1.048264 |  |
| 207 | 2 | e | -0.000956 | -0.000956 | 1.000000 | 0.000000 |  |
| 207 | 2 | f | -0.040281 | -0.048246 | 0.999355 | 0.992676 |  |
| 207 | 2 | g | 0.018805 | -0.001071 | 0.996398 | 1.047422 |  |
| 207 | 2 | h | 0.202720 | 0.195257 | 0.999464 | 1.036831 |  |
| 207 | 2 | j | 0.193024 | 0.191117 | 0.999899 | 0.609649 |  |
| 207 | 2 | i | 0.175987 | 0.167100 | 0.998359 | 0.703438 |  |
| 207 | 2 | m | 0.121846 | 0.105408 | 0.998390 | 1.301823 |  |
| 207 | 2 | n | 0.098820 | 0.079153 | 0.998625 | 1.681503 |  |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## INDEFINITES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 212 | 1 | a | -0.532393 | -0.534533 | 0.999965 | 1.423618 | |
| 212 | 1 | d | -0.630979 | -0.639311 | 0.998061 | 0.833893 | |
| 212 | 1 | e | -0.281644 | -0.326852 | 0.985549 | 1.354565 | |
| 212 | 1 | h | 0.089775 | 0.089848 | 1.000000 | -1.045716 | |
| 212 | 1 | j | -0.592539 | -0.587989 | 0.999360 | -0.762349 | |
| 212 | 1 | m | -0.663788 | -0.668711 | 0.998957 | 0.698407 | |
| 212 | 1 | n | -0.701485 | -0.698844 | 0.999350 | -0.499063 | |
| 212 | 2 | a | -0.553674 | -0.556193 | 0.999956 | 1.510422 | |
| 212 | 2 | b | -0.536118 | -0.537247 | 0.999990 | 1.407011 | |
| 212 | 2 | c | -0.560078 | -0.562278 | 0.999967 | 1.525915 | |
| 212 | 2 | d | -0.683127 | -0.691929 | 0.997280 | 0.790613 | |
| 212 | 2 | e | -0.288411 | -0.322012 | 0.992112 | 1.362189 | |
| 212 | 2 | f | -0.681729 | -0.692550 | 0.997465 | 0.994981 | |
| 212 | 2 | g | -0.692679 | -0.701676 | 0.997236 | 0.810683 | |
| 212 | 2 | h | 0.055268 | 0.055271 | 1.000000 | -0.027818 | |
| 212 | 2 | j | -0.685346 | -0.692573 | 0.999185 | 1.161042 | |
| 212 | 2 | i | 0.004343 | 0.004481 | 1.000000 | -1.698082 | |
| 212 | 2 | m | -0.710908 | -0.718357 | 0.998150 | 0.892495 | |
| 212 | 2 | n | -0.731150 | -0.734941 | 0.998365 | 0.593257 | |

**NOTES:**

**Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO**

**S: Similarity Measure: #1 = Cosine. #2 = Dice**

**TW: Term Weighting Schemes: See Result Page R-1**

**Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.**

**Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.**

**Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.**

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## INDEFINITES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 219 | 1 | a | -0.331415 | -0.331415 | 1.000000 | 0.000000 | |
| 219 | 1 | d | -0.431196 | -0.435440 | 0.993732 | 0.168205 | |
| 219 | 1 | e | -0.001101 | -0.001101 | 1.000000 | 0.000000 | |
| 219 | 1 | h | -0.738016 | -0.738434 | 0.999826 | 0.133221 | |
| 219 | 1 | j | -0.671656 | -0.666366 | 0.997785 | -0.424835 | |
| 219 | 1 | m | -0.541866 | -0.539563 | 0.995675 | -0.117736 | |
| 219 | 1 | n | -0.562968 | -0.558953 | 0.996748 | -0.239634 | |
| 219 | 2 | a | -0.253123 | -0.253123 | 1.000000 | 0.000000 | |
| 219 | 2 | b | -0.223322 | -0.223322 | 1.000000 | 0.000000 | |
| 219 | 2 | c | -0.264359 | -0.264359 | 1.000000 | 0.000000 | |
| 219 | 2 | d | -0.395491 | -0.396543 | 0.991506 | 0.035176 | |
| 219 | 2 | e | -0.001101 | -0.001101 | 1.000000 | 0.000000 | |
| 219 | 2 | f | -0.380616 | -0.376363 | 0.991338 | -0.139554 | |
| 219 | 2 | g | -0.404803 | -0.405428 | 0.991072 | 0.021454 | |
| 219 | 2 | h | -0.769917 | -0.770209 | 0.999729 | 0.078753 | |
| 219 | 2 | j | -0.594641 | -0.588325 | 0.996650 | -0.331196 | |
| 219 | 2 | l | -0.616435 | -0.616045 | 0.999783 | -0.034883 | |
| 219 | 2 | m | -0.504693 | -0.498291 | 0.994031 | -0.270583 | |
| 219 | 2 | n | -0.520418 | -0.512288 | 0.994977 | -0.377661 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## INDEFINITES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 221 | 1 | a | 0.044923 | 0.044756 | 0.999961 | 0.071199 | |
| 221 | 1 | c | 0.075409 | 0.052685 | 0.998553 | 1.582514 | |
| 221 | 1 | e | -0.000885 | -0.000885 | 1.000000 | 0.000000 | |
| 221 | 1 | h | -0.034912 | -0.035029 | 1.000000 | 1.220531 | |
| 221 | 1 | j | -0.072548 | -0.100611 | 0.997579 | 1.512311 | |
| 221 | 1 | m | 0.012463 | -0.012572 | 0.998193 | 1.558466 | |
| 221 | 1 | n | -0.082838 | -0.097667 | 0.999092 | 1.305427 | |
| 221 | 2 | a | 0.035569 | 0.035454 | 0.999933 | 0.037527 | |
| 221 | 2 | b | 0.024068 | 0.023727 | 0.999973 | 0.173684 | |
| 221 | 2 | c | 0.035314 | 0.035149 | 0.999942 | 0.057249 | |
| 221 | 2 | d | 0.040988 | 0.033995 | 0.997325 | 0.357979 | |
| 221 | 2 | e | -0.000885 | -0.000885 | 1.000000 | 0.000000 | |
| 221 | 2 | f | -0.003799 | -0.007429 | 0.996078 | 0.153394 | |
| 221 | 2 | g | 0.035177 | 0.028564 | 0.996824 | 0.312647 | |
| 221 | 2 | h | -0.034210 | -0.034089 | 1.000000 | -1.221367 | |
| 221 | 2 | j | -0.066140 | -0.069308 | 0.999446 | 0.356998 | |
| 221 | 2 | i | -0.001531 | -0.001531 | 1.000000 | 0.000000 | |
| 221 | 2 | m | -0.013498 | -0.015618 | 0.998669 | 0.153694 | |
| 221 | 2 | n | -0.092854 | -0.091717 | 0.999901 | -0.303504 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## INDEFINITES

| Q | S | TW | Correlation Coefficients<br>$r_{ju}$ | <br>$r_{jr}$ | <br>$r_{ur}$ | Significance Level<br>Z | <br>$p > .05$ |
|---|---|---|---|---|---|---|---|
| 222 | 1 | a | -0.065303 | -0.065303 | 1.000000 | 0.000000 | |
| 222 | 1 | d | -0.407137 | -0.335791 | 0.958934 | -1.186072 | |
| 222 | 1 | e | -0.000884 | -0.000884 | 1.000000 | 0.000000 | |
| 222 | 1 | h | -0.182421 | -0.185837 | 0.999604 | 0.552102 | |
| 222 | 1 | j | -0.403934 | -0.371207 | 0.979887 | -0.787117 | |
| 222 | 1 | m | -0.430564 | -0.371317 | 0.971151 | -1.186905 | |
| 222 | 1 | n | -0.194080 | -0.198344 | 0.992970 | 0.164022 | |
| 222 | 2 | a | -0.076259 | -0.076259 | 1.000000 | 0.000000 | |
| 222 | 2 | b | -0.063133 | -0.063133 | 1.000000 | 0.000000 | |
| 222 | 2 | c | -0.073564 | -0.073564 | 1.000000 | 0.000000 | |
| 222 | 2 | d | -0.410846 | -0.375819 | 0.981931 | -0.889177 | |
| 222 | 2 | e | -0.000884 | -0.000884 | 1.000000 | 0.000000 | |
| 222 | 2 | f | -0.338840 | -0.327114 | 0.989143 | -0.377098 | |
| 222 | 2 | g | -0.410581 | -0.378757 | 0.982875 | -0.831185 | |
| 222 | 2 | h | -0.022308 | -0.023060 | 0.999994 | 0.982573 | |
| 222 | 2 | j | -0.430670 | -0.397667 | 0.980397 | -0.813171 | |
| 222 | 2 | l | -0.002454 | -0.002538 | 1.000000 | 0.648074 | |
| 222 | 2 | m | -0.442443 | -0.407506 | 0.979663 | -0.848871 | |
| 222 | 2 | n | -0.256865 | -0.256679 | 0.990220 | -0.006164 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## INDEFINITES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 223 | 1 | a | -0.732594 | -0.732594 | 1.000000 | 0.000000 | |
| 223 | 1 | d | -0.694873 | -0.678547 | 0.960061 | -0.238708 | |
| 223 | 1 | e | -0.000648 | -0.000648 | 1.000000 | 0.000000 | |
| 223 | 1 | h | -0.373036 | -0.372791 | 0.999999 | -0.870524 | |
| 223 | 1 | j | -0.422509 | -0.408334 | 0.999336 | -1.584656 | |
| 223 | 1 | m | -0.695676 | -0.644752 | 0.976911 | -1.126630 | |
| 223 | 1 | n | -0.639829 | -0.579433 | 0.974190 | -1.169080 | |
| 223 | 2 | a | -0.754136 | -0.754136 | 1.000000 | 0.000000 | |
| 223 | 2 | b | -0.718551 | -0.718551 | 1.000000 | 0.000000 | |
| 223 | 2 | c | -0.752835 | -0.752835 | 1.000000 | 0.000002 | |
| 223 | 2 | d | -0.732325 | -0.733488 | 0.978226 | 0.032851 | |
| 223 | 2 | e | -0.000648 | -0.000648 | 1.000000 | 0.000000 | |
| 223 | 2 | f | -0.709220 | -0.717798 | 0.984534 | 0.260585 | |
| 223 | 2 | g | -0.731842 | -0.734684 | 0.979498 | 0.077675 | |
| 223 | 2 | h | -0.361158 | -0.359903 | 0.999975 | -0.702043 | |
| 223 | 2 | j | -0.389875 | -0.384997 | 0.999833 | -1.083664 | |
| 223 | 2 | l | -0.315803 | -0.315320 | 0.999997 | -0.826624 | |
| 223 | 2 | m | -0.726692 | -0.704031 | 0.988673 | -0.781386 | |
| 223 | 2 | n | -0.670259 | -0.639677 | 0.986943 | -0.903943 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### INDEFINITES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 227 | 1 | a | -0.128573 | -0.128573 | 1.000000 | 0.000000 | |
| 227 | 1 | d | -0.321199 | -0.364801 | 0.949885 | 0.654837 | |
| 227 | 1 | e | -0.000658 | -0.000658 | 1.000000 | 0.000000 | |
| 227 | 1 | h | 0.333390 | 0.338044 | 0.930107 | -0.157102 | |
| 227 | 1 | j | 0.059223 | 0.037574 | 0.968195 | 0.384391 | |
| 227 | 1 | m | -0.227812 | -0.268424 | 0.947537 | 0.578773 | |
| 227 | 1 | n | -0.061523 | -0.111317 | 0.960007 | 0.790844 | |
| 227 | 2 | a | -0.122705 | -0.122705 | 1.000000 | 0.000000 | |
| 227 | 2 | b | -0.133699 | -0.133699 | 1.000000 | 0.000000 | |
| 227 | 2 | c | -0.126353 | -0.126353 | 1.000000 | 0.000000 | |
| 227 | 2 | d | -0.288205 | -0.327784 | 0.966682 | 0.719152 | |
| 227 | 2 | e | -0.000658 | -0.000658 | 1.000000 | 0.000000 | |
| 227 | 2 | f | -0.282278 | -0.322813 | 0.975858 | 0.862224 | |
| 227 | 2 | g | -0.290104 | -0.330734 | 0.967472 | 0.747528 | |
| 227 | 2 | h | 0.331148 | 0.336297 | 0.997306 | -0.332534 | |
| 227 | 2 | j | 0.023736 | 0.002447 | 0.978523 | 0.459486 | |
| 227 | 2 | i | 0.037912 | 0.094589 | 0.985453 | -1.489317 | |
| 227 | 2 | m | -0.214012 | -0.252393 | 0.964586 | 0.662769 | |
| 227 | 2 | n | -0.066552 | -0.111433 | 0.967368 | 0.789160 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## INDEFINITES

| Q | S | TW | Correlation Coefficients $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Significance Level Z | $p > .05$ |
|---|---|---|---|---|---|---|---|
| 230 | 1 | a | -0.373570 | -0.373570 | 1.000000 | 0.000000 | |
| 230 | 1 | d | -0.251948 | -0.245952 | 0.973601 | -0.117476 | |
| 230 | 1 | e | -0.000600 | -0.000600 | 1.000000 | 0.000000 | |
| 230 | 1 | h | 0.076769 | 0.076757 | 0.999979 | 0.008106 | |
| 230 | 1 | j | 0.058008 | 0.065870 | 0.997114 | -0.451945 | |
| 230 | 1 | m | -0.102239 | -0.094741 | 0.985114 | -0.190339 | |
| 230 | 1 | n | -0.169797 | -0.164029 | 0.983825 | -0.141787 | |
| 230 | 2 | a | -0.305620 | -0.305620 | 1.000000 | 0.000000 | |
| 230 | 2 | b | -0.234657 | -0.234657 | 1.000000 | 0.000000 | |
| 230 | 2 | c | -0.301274 | -0.301274 | 1.000000 | 0.000000 | |
| 230 | 2 | d | -0.197532 | -0.200564 | 0.977652 | 0.063798 | |
| 230 | 2 | e | -0.000600 | -0.000600 | 1.000000 | 0.000000 | |
| 230 | 2 | f | -0.149564 | -0.156477 | 0.983113 | 0.165920 | |
| 230 | 2 | g | -0.196159 | -0.199755 | 0.976409 | 0.073618 | |
| 230 | 2 | h | 0.064555 | 0.068055 | 0.999842 | -0.861271 | |
| 230 | 2 | j | 0.074391 | 0.081242 | 0.997614 | -0.433525 | |
| 230 | 2 | i | 0.073664 | 0.074659 | 0.999982 | -0.722802 | |
| 230 | 2 | m | -0.075132 | -0.077109 | 0.982990 | 0.046880 | |
| 230 | 2 | n | -0.137167 | -0.139718 | 0.980198 | 0.056424 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## INDEFINITES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 235 | 1 | a | -0.031123 | -0.031123 | 1.000000 | 0.000000 | |
| 235 | 1 | d | -0.329375 | -0.323510 | 0.998940 | -0.570205 | |
| 235 | 1 | e | -0.000931 | -0.000931 | 1.000000 | 0.000000 | |
| 235 | 1 | h | -0.094045 | -0.069413 | 0.995133 | -1.062404 | |
| 235 | 1 | j | -0.506407 | -0.503594 | 0.997486 | -0.194924 | |
| 235 | 1 | m | -0.397157 | -0.392297 | 0.998345 | -0.389353 | |
| 235 | 1 | n | -0.457890 | -0.453587 | 0.997284 | -0.277949 | |
| 235 | 2 | a | -0.160684 | -0.160684 | 1.000000 | 0.000000 | |
| 235 | 2 | b | -0.226216 | -0.226216 | 1.000000 | 0.000000 | |
| 235 | 2 | c | -0.155708 | -0.155708 | 1.000000 | 0.000000 | |
| 235 | 2 | d | -0.361740 | -0.361747 | 0.998940 | 0.000722 | |
| 235 | 2 | e | -0.000931 | -0.000931 | 1.000000 | 0.000000 | |
| 235 | 2 | f | -0.412523 | -0.417331 | 0.998649 | 0.430351 | |
| 235 | 2 | g | -0.362648 | -0.363351 | 0.998869 | 0.067272 | |
| 235 | 2 | h | -0.126989 | -0.120016 | 0.999415 | -0.871020 | |
| 235 | 2 | j | -0.453489 | -0.455260 | 0.998212 | 0.140986 | |
| 235 | 2 | l | -0.014128 | -0.013328 | 0.999393 | -0.906030 | |
| 235 | 2 | m | -0.403257 | -0.403586 | 0.998522 | 0.028018 | |
| 235 | 2 | n | -0.434261 | -0.434530 | 0.997962 | 0.013860 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## INDEFINITES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 248 | 1 | a | -0.174181 | -0.171062 | 0.999838 | -0.990842 | |
| 248 | 1 | d | -0.376824 | -0.401778 | 0.995723 | 1.285642 | |
| 248 | 1 | e | -0.001000 | -0.001000 | 1.000000 | 0.000000 | |
| 248 | 1 | h | -0.209710 | -0.209715 | 1.000000 | 1.908137 | |
| 248 | 1 | j | -0.240205 | -0.244108 | 0.999876 | 1.136981 | |
| 248 | 1 | m | -0.384995 | -0.400380 | 0.998027 | 1.172069 | |
| 248 | 1 | n | -0.315971 | -0.330202 | 0.998450 | 1.194390 | |
| 248 | 2 | a | -0.162555 | -0.158754 | 0.999855 | -1.010935 | |
| 248 | 2 | b | -0.162328 | -0.160639 | 0.999969 | -0.978255 | |
| 248 | 2 | c | -0.165652 | -0.162231 | 0.999882 | -1.006056 | |
| 248 | 2 | d | -0.388644 | -0.410135 | 0.997319 | 1.398259 | |
| 248 | 2 | e | -0.001000 | -0.001000 | 1.000000 | 0.000000 | |
| 248 | 2 | f | -0.387811 | -0.408083 | 0.998418 | 1.696249 | |
| 248 | 2 | g | -0.385112 | -0.407324 | 0.997400 | 1.462456 | |
| 248 | 2 | h | -0.209574 | -0.209576 | 1.000000 | 0.653858 | |
| 248 | 2 | j | -0.253679 | -0.255578 | 0.999934 | 0.764880 | |
| 248 | 2 | l | -0.206419 | -0.206443 | 1.000000 | 1.938001 | |
| 248 | 2 | m | -0.426066 | -0.440730 | 0.998495 | 1.294952 | |
| 248 | 2 | n | -0.348954 | -0.360402 | 0.998800 | 1.104669 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

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Page

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## INDEFINITES

|  |  |  | Correlation Coefficients |  |  | Significance Level |  |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 252 | 1 | a | 0.087821 | 0.082385 | 0.999928 | 1.329748 |  |
| 252 | 1 | d | 0.146321 | 0.155483 | 0.937488 | -0.554456 |  |
| 252 | 1 | e | -0.000931 | -0.000931 | 1.000000 | 0.000000 |  |
| 252 | 1 | h | 0.187661 | 0.191518 | 0.938958 | -0.364943 |  |
| 252 | 1 | j | 0.209856 | 0.222480 | 0.994604 | -0.527554 |  |
| 252 | 1 | m | 0.200105 | 0.207138 | 0.998657 | -0.587296 |  |
| 252 | 1 | n | 0.253456 | 0.256671 | 0.999716 | -0.590400 |  |
| 252 | 2 | a | 0.006594 | -0.000371 | 0.999895 | 2.045190 | <**** |
| 252 | 2 | b | -0.029094 | -0.032597 | 0.999574 | 2.072719 | <**** |
| 252 | 2 | c | 0.009133 | 0.002802 | 0.999913 | 2.039117 | <**** |
| 252 | 2 | d | 0.188045 | 0.176063 | 0.998716 | 1.017375 |  |
| 252 | 2 | e | -0.000931 | -0.000931 | 1.000000 | 0.000000 |  |
| 252 | 2 | f | 0.095067 | 0.076337 | 0.998618 | 1.514992 |  |
| 252 | 2 | g | 0.196328 | 0.182969 | 0.998639 | 1.102349 |  |
| 252 | 2 | h | 0.024025 | 0.024478 | 0.999987 | -0.375015 |  |
| 252 | 2 | j | 0.244992 | 0.242255 | 0.999147 | 0.289747 |  |
| 252 | 2 | i | 0.000861 | 0.000896 | 1.000000 | -0.374171 |  |
| 252 | 2 | m | 0.248129 | 0.240101 | 0.999234 | 0.894038 |  |
| 252 | 2 | h | 0.295229 | 0.293866 | 0.999794 | 0.297747 |  |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## RESIDUAL ADJECTIVES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 203 | 1 | a | -0.105343 | -0.106148 | 0.999980 | 0.553864 | |
| 203 | 1 | d | -0.141626 | -0.148431 | 0.998280 | 0.510848 | |
| 203 | 1 | e | -0.001022 | -0.001022 | 1.000000 | 0.000000 | |
| 203 | 1 | h | 0.117064 | 0.109540 | 0.999843 | 1.856761 | |
| 203 | 1 | j | 0.072857 | 0.065661 | 0.998533 | 0.580401 | |
| 203 | 1 | m | -0.097276 | -0.107394 | 0.997989 | 0.698823 | |
| 203 | 1 | n | -0.012827 | -0.016290 | 0.998706 | 0.296710 | |
| 203 | 2 | a | -0.042574 | -0.043710 | 0.999964 | 0.582901 | |
| 203 | 2 | b | 0.005796 | 0.005370 | 0.999995 | 0.574551 | |
| 203 | 2 | c | -0.037613 | -0.038579 | 0.999374 | 0.585132 | |
| 203 | 2 | d | -0.070321 | -0.082310 | 0.999104 | 1.237431 | |
| 203 | 2 | e | -0.001022 | -0.001022 | 1.000000 | 0.000000 | |
| 203 | 2 | f | -0.036263 | -0.049983 | 0.999401 | 1.729432 | |
| 203 | 2 | g | -0.070989 | -0.084079 | 0.999124 | 1.365976 | |
| 203 | 2 | h | 0.069005 | 0.066236 | 0.999974 | 1.683621 | |
| 203 | 2 | j | 0.034705 | 0.022204 | 0.999062 | 1.258716 | |
| 203 | 2 | i | 0.002329 | 0.002250 | 1.000000 | 0.398162 | |
| 203 | 2 | m | -0.044468 | -0.058740 | 0.998959 | 1.364828 | |
| 203 | 2 | n | 0.004985 | -0.002747 | 0.999306 | 0.905780 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## RESIDUAL ADJECTIVES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 207 | 1 | a | 0.089728 | 0.088733 | 0.999863 | 0.269908 | |
| 207 | 1 | d | -0.006064 | -0.006862 | 0.999871 | 0.222224 | |
| 207 | 1 | e | -0.000956 | -0.000956 | 1.000000 | 0.000000 | |
| 207 | 1 | h | 0.213822 | 0.213823 | 1.000000 | -0.147577 | |
| 207 | 1 | j | 0.168212 | 0.168294 | 0.999995 | -0.119662 | |
| 207 | 1 | m | 0.099118 | 0.099079 | 0.999963 | 0.020531 | |
| 207 | 1 | n | 0.064855 | 0.065088 | 0.999974 | -0.146065 | |
| 207 | 2 | a | 0.069602 | 0.068528 | 0.999717 | 0.202447 | |
| 207 | 2 | b | 0.054739 | 0.054262 | 0.999936 | 0.188977 | |
| 207 | 2 | c | 0.070263 | 0.069245 | 0.999765 | 0.212202 | |
| 207 | 2 | d | 0.021932 | 0.022621 | 0.998963 | -0.267669 | |
| 207 | 2 | e | -0.000956 | -0.000956 | 1.000000 | 0.000000 | |
| 207 | 2 | f | -0.040281 | -0.038660 | 0.998391 | -0.127885 | |
| 207 | 2 | g | 0.018805 | 0.019420 | 0.998886 | -0.258332 | |
| 207 | 2 | h | 0.202720 | 0.202736 | 1.000000 | -1.053751 | |
| 207 | 2 | j | 0.193024 | 0.193427 | 0.999992 | -0.447260 | |
| 207 | 2 | i | 0.175987 | 0.176003 | 1.000000 | -0.695023 | |
| 207 | 2 | m | 0.121846 | 0.122700 | 0.999803 | -0.193783 | |
| 207 | 2 | n | 0.098820 | 0.100731 | 0.999934 | -0.744773 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## RESIDUAL ADJECTIVES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 212 | 1 | a | -0.532393 | -0.534533 | 0.999965 | 1.423618 | |
| 212 | 1 | d | -0.630979 | -0.617442 | 0.995464 | -0.875176 | |
| 212 | 1 | e | -0.281644 | -0.311513 | 0.982702 | 0.821361 | |
| 212 | 1 | h | 0.089775 | 0.089747 | 1.000000 | 1.676563 | |
| 212 | 1 | j | -0.592539 | -0.580117 | 0.996792 | -0.921043 | |
| 212 | 1 | m | -0.663788 | -0.650951 | 0.996615 | -0.987932 | |
| 212 | 1 | n | -0.701485 | -0.686023 | 0.997651 | -1.437058 | |
| 212 | 2 | a | -0.553674 | -0.556193 | 0.999956 | 1.510422 | |
| 212 | 2 | b | -0.536118 | -0.537247 | 0.999990 | 1.407011 | |
| 212 | 2 | c | -0.560078 | -0.562278 | 0.999967 | 1.525915 | |
| 212 | 2 | d | -0.683127 | -0.684623 | 0.997974 | 0.157717 | |
| 212 | 2 | e | -0.288411 | -0.299793 | 0.988173 | 0.379156 | |
| 212 | 2 | f | -0.681729 | -0.687163 | 0.998602 | 0.581362 | |
| 212 | 2 | g | -0.692679 | -0.694815 | 0.998031 | 0.231210 | |
| 212 | 2 | h | 0.055268 | 0.055208 | 1.000000 | 2.446004 | (**** |
| 212 | 2 | j | -0.685346 | -0.685642 | 0.999039 | 0.045365 | |
| 212 | 2 | i | 0.004343 | 0.004343 | 1.000000 | 0.000000 | |
| 212 | 2 | m | -0.710908 | -0.711490 | 0.998727 | 0.080444 | |
| 212 | 2 | n | -0.731150 | -0.728661 | 0.999588 | -0.513891 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## RESIDUAL ADJECTIVES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 219 | 1 | a | -0.331415 | -0.331415 | 1.000000 | 0.000000 | |
| 219 | 1 | d | -0.431196 | -0.430073 | 0.999931 | -1.145037 | |
| 219 | 1 | e | -0.001101 | -0.001101 | 1.000000 | 0.000000 | |
| 219 | 1 | h | -0.738016 | -0.737903 | 1.000000 | -1.709957 | |
| 219 | 1 | j | -0.671656 | -0.670533 | 0.999995 | -1.692956 | |
| 219 | 1 | m | -0.541866 | -0.540698 | 0.999993 | -1.370413 | |
| 219 | 1 | n | -0.562968 | -0.561691 | 0.999992 | -1.422246 | |
| 219 | 2 | a | -0.253123 | -0.253123 | 1.000000 | 0.000000 | |
| 219 | 2 | b | -0.223322 | -0.223322 | 1.000000 | 0.000000 | |
| 219 | 2 | c | -0.264359 | -0.264359 | 1.000000 | 0.000000 | |
| 219 | 2 | d | -0.395491 | -0.394188 | 0.999988 | -1.154594 | |
| 219 | 2 | e | -0.001101 | -0.001101 | 1.000000 | 0.000000 | |
| 219 | 2 | f | -0.380616 | -0.379951 | 0.999997 | -1.141430 | |
| 219 | 2 | g | -0.404803 | -0.403586 | 0.999990 | -1.151862 | |
| 219 | 2 | h | -0.769917 | -0.769824 | 1.000000 | -1.823177 | |
| 219 | 2 | j | -0.594641 | -0.593935 | 0.999998 | -1.560532 | |
| 219 | 2 | l | -0.616435 | -0.616371 | 1.000000 | -1.472356 | |
| 219 | 2 | m | -0.504693 | -0.503757 | 0.999995 | -1.360601 | |
| 219 | 2 | n | -0.520418 | -0.519481 | 0.999996 | -1.397875 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## RESIDUAL ADJECTIVES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 221 | 1 | a | 0.044923 | 0.044756 | 0.999961 | 0.071199 | |
| 221 | 1 | d | 0.075409 | 0.055584 | 0.994688 | 0.721152 | |
| 221 | 1 | e | -0.000885 | -0.000885 | 1.000000 | 0.000000 | |
| 221 | 1 | h | -0.034912 | -0.034861 | 1.000000 | -0.531102 | |
| 221 | 1 | j | -0.072548 | -0.084293 | 0.998980 | 0.975130 | |
| 221 | 1 | m | 0.012463 | -0.004406 | 0.997030 | 0.819064 | |
| 221 | 1 | n | -0.082838 | -0.090558 | 0.999444 | 0.868784 | |
| 221 | 2 | a | 0.035569 | 0.035454 | 0.999933 | 0.037527 | |
| 221 | 2 | b | 0.024068 | 0.023727 | 0.999973 | 0.173684 | |
| 221 | 2 | c | 0.035314 | 0.035149 | 0.999942 | 0.057249 | |
| 221 | 2 | d | 0.040988 | 0.022728 | 0.992589 | 0.562132 | |
| 221 | 2 | e | -0.000685 | -0.000885 | 1.000000 | 0.000000 | |
| 221 | 2 | f | -0.003799 | -0.020693 | 0.993711 | 0.563734 | |
| 221 | 2 | g | 0.035177 | 0.016157 | 0.991892 | 0.559140 | |
| 221 | 2 | h | -0.034210 | -0.034158 | 1.000000 | -0.529894 | |
| 221 | 2 | j | -0.066140 | -0.076286 | 0.998430 | 0.678972 | |
| 221 | 2 | l | -0.001531 | -0.001531 | 1.000000 | 0.000000 | |
| 221 | 2 | m | -0.013498 | -0.027681 | 0.996252 | 0.613142 | |
| 221 | 2 | n | -0.092854 | -0.099614 | 0.999349 | 0.703887 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

### A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## RESIDUAL ADJECTIVES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 222 | 1 | a | -0.065303 | -0.065303 | 1.000000 | 0.000000 | |
| 222 | 1 | d | -0.407137 | -0.402087 | 0.999147 | -0.595397 | |
| 222 | 1 | e | -0.000884 | -0.000884 | 1.000000 | 0.000000 | |
| 222 | 1 | h | -0.182421 | -0.182265 | 1.000000 | -1.156142 | |
| 222 | 1 | j | -0.403934 | -0.402457 | 0.999895 | -0.495627 | |
| 222 | 1 | m | -0.430564 | -0.427582 | 0.999605 | -0.523476 | |
| 222 | 1 | n | -0.194080 | -0.195372 | 0.999992 | 1.506461 | |
| 222 | 2 | a | -0.076259 | -0.076259 | 1.000000 | 0.000000 | |
| 222 | 2 | b | -0.063133 | -0.063133 | 1.000000 | 0.000000 | |
| 222 | 2 | c | -0.073564 | -0.073564 | 1.000000 | 0.000000 | |
| 222 | 2 | d | -0.410846 | -0.404633 | 0.999229 | -0.769249 | |
| 222 | 2 | e | -0.000884 | -0.000884 | 1.000000 | 0.000000 | |
| 222 | 2 | f | -0.338840 | -0.330964 | 0.999132 | -0.891441 | |
| 222 | 2 | g | -0.410581 | -0.404013 | 0.999173 | -0.784552 | |
| 222 | 2 | h | -0.022308 | -0.022308 | 1.000000 | 0.000000 | |
| 222 | 2 | j | -0.430670 | -0.426753 | 0.999656 | -0.733350 | |
| 222 | 2 | i | -0.002454 | -0.002454 | 1.000000 | 0.000000 | |
| 222 | 2 | m | -0.442443 | -0.437722 | 0.999463 | -0.712356 | |
| 222 | 2 | n | -0.256865 | -0.256762 | 0.999934 | -0.132990 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## RESIDUAL ADJECTIVES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 223 | 1 | a | -0.732594 | -0.732594 | 1.000000 | 0.000000 | |
| 223 | 1 | d | -0.694873 | -0.694671 | 0.999577 | -0.036191 | |
| 223 | 1 | e | -0.000648 | -0.000648 | 1.000000 | 0.000000 | |
| 223 | 1 | h | -0.373036 | -0.373034 | 1.000000 | -0.040247 | |
| 223 | 1 | j | -0.422509 | -0.422606 | 0.999992 | 0.099842 | |
| 223 | 1 | m | -0.695676 | -0.694873 | 0.999624 | -0.152344 | |
| 223 | 1 | n | -0.639829 | -0.639024 | 0.999351 | -0.108592 | |
| 223 | 2 | a | -0.754136 | -0.754136 | 1.000000 | 0.000000 | |
| 223 | 2 | b | -0.718551 | -0.718551 | 1.000000 | 0.000000 | |
| 223 | 2 | c | -0.752835 | -0.752835 | 1.000000 | 0.000000 | |
| 223 | 2 | d | -0.732325 | -0.731614 | 0.999758 | -0.177229 | |
| 223 | 2 | e | -0.000648 | -0.000648 | 1.000000 | 0.000000 | |
| 223 | 2 | f | -0.709220 | -0.708001 | 0.999524 | -0.235080 | |
| 223 | 2 | g | -0.731842 | -0.730932 | 0.999726 | -0.212666 | |
| 223 | 2 | h | -0.361158 | -0.361152 | 1.000000 | -0.328827 | |
| 223 | 2 | j | -0.389875 | -0.389766 | 0.999997 | -0.183723 | |
| 223 | 2 | l | -0.315803 | -0.315803 | 1.000000 | 0.000000 | |
| 223 | 2 | m | -0.726692 | -0.725828 | 0.999753 | -0.211110 | |
| 223 | 2 | n | -0.670259 | -0.668484 | 0.999639 | -0.331034 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## RESIDUAL ADJECTIVES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 227 | 1 | a | -0.128573 | -0.128573 | 1.000000 | 0.000000 | |
| 227 | 1 | d | -0.321199 | -0.376555 | 0.982406 | 1.385905 | |
| 227 | 1 | e | -0.000658 | -0.000658 | 1.000000 | 0.000000 | |
| 227 | 1 | h | 0.333390 | 0.337958 | 0.990110 | -0.154236 | |
| 227 | 1 | j | 0.059223 | 0.028478 | 0.993779 | 1.234047 | |
| 227 | 1 | m | -0.227812 | -0.282646 | 0.981532 | 1.310515 | |
| 227 | 1 | n | -0.061523 | -0.111850 | 0.982482 | 1.207144 | |
| 227 | 2 | a | -0.122705 | -0.122705 | 1.000000 | 0.000000 | |
| 227 | 2 | b | -0.133699 | -0.133699 | 1.000000 | 0.000000 | |
| 227 | 2 | c | -0.126353 | -0.126353 | 1.000000 | 0.000000 | |
| 227 | 2 | d | -0.288205 | -0.340908 | 0.984912 | 1.410279 | |
| 227 | 2 | e | -0.000658 | -0.000658 | 1.000000 | 0.000000 | |
| 227 | 2 | f | -0.282278 | -0.331979 | 0.984462 | 1.310522 | |
| 227 | 2 | g | -0.290104 | -0.344101 | 0.984230 | 1.414211 | |
| 227 | 2 | h | 0.331148 | 0.336407 | 0.997310 | -0.339819 | |
| 227 | 2 | j | 0.023736 | -0.009689 | 0.992821 | 1.248016 | |
| 227 | 2 | l | 0.037912 | 0.094589 | 0.985453 | -1.489917 | |
| 227 | 2 | m | -0.214012 | -0.265246 | 0.984349 | 1.325427 | |
| 227 | 2 | n | -0.066552 | -0.115033 | 0.984419 | 1.233237 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

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Page

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### RESIDUAL ADJECTIVES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 230 | 1 | a | -0.373570 | -0.373570 | 1.000000 | 0.000000 | |
| 230 | 1 | d | -0.251948 | -0.228853 | 0.953384 | -0.339792 | |
| 230 | 1 | e | -0.000600 | -0.000600 | 1.000000 | 0.000000 | |
| 230 | 1 | h | 0.076769 | 0.102748 | 0.995429 | -1.188443 | |
| 230 | 1 | j | 0.058008 | 0.071562 | 0.996303 | -0.688479 | |
| 230 | 1 | m | -0.102239 | -0.079787 | 0.975782 | -0.446583 | |
| 230 | 1 | n | -0.169797 | -0.140125 | 0.973112 | -0.564495 | |
| 230 | 2 | a | -0.305620 | -0.305620 | 1.000000 | 0.000000 | |
| 230 | 2 | b | -0.234657 | -0.234657 | 1.000000 | 0.000000 | |
| 230 | 2 | c | -0.301274 | -0.301274 | 1.000000 | 0.000000 | |
| 230 | 2 | d | -0.197532 | -0.196111 | 0.961831 | -0.022878 | |
| 230 | 2 | e | -0.000600 | -0.000600 | 1.000000 | 0.000000 | |
| 230 | 2 | f | -0.149564 | -0.154653 | 0.970621 | 0.092608 | |
| 230 | 2 | g | -0.196159 | -0.196062 | 0.959678 | -0.001521 | |
| 230 | 2 | h | 0.064555 | 0.083648 | 0.997631 | -1.211830 | |
| 230 | 2 | j | 0.074391 | 0.075794 | 0.997745 | -0.091302 | |
| 230 | 2 | l | 0.073664 | 0.080383 | 0.999684 | -1.168519 | |
| 230 | 2 | m | -0.075132 | -0.075789 | 0.972691 | 0.012299 | |
| 230 | 2 | n | -0.137167 | -0.134730 | 0.969785 | -0.043617 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

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Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## RESIDUAL ADJECTIVES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 235 | 1 | a | -0.031123 | -0.031123 | 1.000000 | 0.000000 | |
| 235 | 1 | d | -0.329375 | -0.328414 | 0.999977 | -0.630002 | |
| 235 | 1 | e | -0.000931 | -0.000931 | 1.000000 | 0.000000 | |
| 235 | 1 | h | -0.094045 | -0.094037 | 1.000000 | -0.671878 | |
| 235 | 1 | j | -0.506407 | -0.504925 | 0.999937 | -0.644094 | |
| 235 | 1 | m | -0.397157 | -0.395828 | 0.999960 | -0.681098 | |
| 235 | 1 | n | -0.457890 | -0.456009 | 0.999933 | -0.766970 | |
| 235 | 2 | a | -0.160684 | -0.160684 | 1.000000 | 0.000000 | |
| 235 | 2 | b | -0.226216 | -0.226216 | 1.000000 | 0.000000 | |
| 235 | 2 | c | -0.155708 | -0.155708 | 1.000000 | 0.000000 | |
| 235 | 2 | d | -0.361740 | -0.360974 | 0.999981 | -0.563587 | |
| 235 | 2 | e | -0.000931 | -0.000931 | 1.000000 | 0.000000 | |
| 235 | 2 | f | -0.412523 | -0.412119 | 0.999994 | -0.523427 | |
| 235 | 2 | g | -0.362648 | -0.361956 | 0.999984 | -0.559762 | |
| 235 | 2 | h | -0.126989 | -0.126878 | 1.000000 | -0.649706 | |
| 235 | 2 | j | -0.453489 | -0.452531 | 0.999976 | -0.650605 | |
| 235 | 2 | l | -0.014128 | -0.014068 | 1.000000 | -0.641533 | |
| 235 | 2 | m | -0.403257 | -0.402397 | 0.999981 | -0.634816 | |
| 235 | 2 | n | -0.434261 | -0.433189 | 0.999975 | -0.713140 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## RESIDUAL ADJECTIVES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 248 | 1 | a | -0.174181 | -0.171062 | 0.999898 | -0.990842 | |
| 248 | 1 | d | -0.376824 | -0.432920 | 0.961978 | 0.986158 | |
| 248 | 1 | e | -0.001000 | -0.001000 | 1.000000 | 0.000000 | |
| 248 | 1 | h | -0.209710 | -0.209635 | 0.999999 | -0.249116 | |
| 248 | 1 | j | -0.240205 | -0.243935 | 0.999592 | 0.601316 | |
| 248 | 1 | m | -0.384995 | -0.378511 | 0.985321 | -0.163179 | |
| 248 | 1 | n | -0.315971 | -0.320346 | 0.991109 | 0.154769 | |
| 248 | 2 | a | -0.162555 | -0.158754 | 0.999835 | -1.010535 | |
| 248 | 2 | b | -0.162328 | -0.160639 | 0.999963 | -0.978255 | |
| 248 | 2 | c | -0.165652 | -0.162231 | 0.999882 | -1.006056 | |
| 248 | 2 | d | -0.388644 | -0.458035 | 0.950784 | 1.079765 | |
| 248 | 2 | e | -0.001000 | -0.001000 | 1.000000 | 0.000000 | |
| 248 | 2 | f | -0.387811 | -0.464474 | 0.932274 | 1.021533 | |
| 248 | 2 | g | -0.385112 | -0.457215 | 0.945090 | 1.062198 | |
| 248 | 2 | h | -0.209574 | -0.209490 | 0.999996 | -0.137185 | |
| 248 | 2 | j | -0.253679 | -0.246109 | 0.998955 | -0.762547 | |
| 248 | 2 | l | -0.206419 | -0.208055 | 0.998351 | 0.130231 | |
| 248 | 2 | m | -0.426066 | -0.402240 | 0.964065 | -0.436521 | |
| 248 | 2 | n | -0.348954 | -0.337148 | 0.974595 | -0.249442 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## RESIDUAL ADJECTIVES

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 252 | 1 | a | 0.087821 | 0.087821 | 1.000000 | 0.000000 | |
| 252 | 1 | d | 0.146321 | 0.142479 | 0.999663 | 0.633625 | |
| 252 | 1 | e | -0.000931 | -0.000931 | 1.000000 | 0.000000 | |
| 252 | 1 | h | 0.187661 | 0.192027 | 0.998954 | -0.412223 | |
| 252 | 1 | j | 0.209856 | 0.220785 | 0.995109 | -0.479707 | |
| 252 | 1 | m | 0.200105 | 0.198632 | 0.999614 | 0.229734 | |
| 252 | 1 | n | 0.253456 | 0.252892 | 0.999964 | 0.292842 | |
| 252 | 2 | a | 0.006594 | 0.006594 | 1.000000 | 0.000000 | |
| 252 | 2 | b | -0.029094 | -0.029094 | 1.000000 | 0.000000 | |
| 252 | 2 | c | 0.009133 | 0.009133 | 1.000000 | 0.000000 | |
| 252 | 2 | d | 0.188045 | 0.182595 | 0.999405 | 0.681319 | |
| 252 | 2 | e | -0.000931 | -0.000931 | 1.000000 | 0.000000 | |
| 252 | 2 | f | 0.095067 | 0.089059 | 0.999268 | 0.668736 | |
| 252 | 2 | g | 0.196328 | 0.190393 | 0.999344 | 0.707253 | |
| 252 | 2 | h | 0.024025 | 0.024478 | 0.999987 | -0.375015 | |
| 252 | 2 | j | 0.244992 | 0.246097 | 0.999414 | -0.141210 | |
| 252 | 2 | l | 0.000861 | 0.000896 | 1.000000 | -0.374171 | |
| 252 | 2 | m | 0.248129 | 0.244324 | 0.999630 | 0.514756 | |
| 252 | 2 | n | 0.295229 | 0.294767 | 0.999967 | 0.250804 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### ADVERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 203 | 1 | a | -0.105343 | -0.106148 | 0.999980 | 0.553864 | |
| 203 | 1 | d | -0.141626 | -0.142082 | 0.999987 | 0.396757 | |
| 203 | 1 | e | -0.001022 | -0.001022 | 1.000000 | 0.000000 | |
| 203 | 1 | h | 0.117064 | 0.117064 | 1.000000 | 0.000000 | |
| 203 | 1 | j | 0.072857 | 0.072786 | 1.000000 | 0.411022 | |
| 203 | 1 | m | -0.037276 | -0.037666 | 0.999994 | 0.513715 | |
| 203 | 1 | n | -0.012827 | -0.013044 | 0.999999 | 0.849521 | |
| 203 | 2 | a | -0.042574 | -0.043710 | 0.999964 | 0.582901 | |
| 203 | 2 | b | 0.005796 | 0.005370 | 0.999995 | 0.574551 | |
| 203 | 2 | c | -0.037613 | -0.038579 | 0.999974 | 0.585132 | |
| 203 | 2 | d | -0.070321 | -0.070961 | 0.999984 | 0.501539 | |
| 203 | 2 | e | -0.001022 | -0.001022 | 1.000000 | 0.000000 | |
| 203 | 2 | f | -0.036263 | -0.036557 | 0.999997 | 0.535096 | |
| 203 | 2 | g | -0.070989 | -0.071555 | 0.999988 | 0.496935 | |
| 203 | 2 | h | 0.069005 | 0.069005 | 1.000000 | 0.000000 | |
| 203 | 2 | j | 0.034705 | 0.034300 | 0.999995 | 0.544439 | |
| 203 | 2 | l | 0.002329 | 0.002329 | 1.000000 | 0.000000 | |
| 203 | 2 | m | -0.044468 | -0.045014 | 0.999990 | 0.526024 | |
| 203 | 2 | n | 0.004985 | 0.004512 | 0.999996 | 0.710858 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

Page

# A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## ADVERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 207 | 1 | a | 0.089728 | 0.088733 | 0.999863 | 0.269908 | |
| 207 | 1 | d | -0.006064 | 0.032065 | 0.992816 | -1.423458 | |
| 207 | 1 | e | -0.000956 | -0.000956 | 1.000000 | 0.000000 | |
| 207 | 1 | h | 0.213822 | 0.213874 | 1.000000 | -0.850277 | |
| 207 | 1 | j | 0.168212 | 0.174635 | 0.999839 | -1.615627 | |
| 207 | 1 | m | 0.099118 | 0.121884 | 0.997082 | -1.338973 | |
| 207 | 1 | n | 0.064855 | 0.084285 | 0.997783 | -1.307989 | |
| 207 | 2 | a | 0.069602 | 0.068528 | 0.999717 | 0.202447 | |
| 207 | 2 | b | 0.054739 | 0.054262 | 0.999936 | 0.188977 | |
| 207 | 2 | c | 0.070263 | 0.069245 | 0.999769 | 0.212202 | |
| 207 | 2 | d | 0.021932 | 0.048181 | 0.997133 | -1.551208 | |
| 207 | 2 | e | -0.000956 | -0.000956 | 1.000000 | 0.000000 | |
| 207 | 2 | f | -0.040281 | -0.025129 | 0.998944 | -1.475142 | |
| 207 | 2 | g | 0.018805 | 0.042610 | 0.997630 | -1.547063 | |
| 207 | 2 | h | 0.202720 | 0.202787 | 1.000000 | -1.210457 | |
| 207 | 2 | j | 0.193024 | 0.195876 | 0.999971 | -1.702039 | |
| 207 | 2 | l | 0.175987 | 0.176039 | 1.000000 | -1.043860 | |
| 207 | 2 | m | 0.121846 | 0.135433 | 0.999145 | -1.477537 | |
| 207 | 2 | n | 0.098820 | 0.111597 | 0.999273 | -1.504133 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## ADVERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 212 | 1 | a | -0.532393 | -0.534533 | 0.999965 | 1.423618 | |
| 212 | 1 | d | -0.630979 | -0.640823 | 0.997044 | 0.799834 | |
| 212 | 1 | e | -0.281644 | -0.331317 | 0.984298 | 1.427274 | |
| 212 | 1 | h | 0.089775 | 0.088470 | 0.999987 | 1.250839 | |
| 212 | 1 | j | -0.592539 | -0.604145 | 0.997900 | 1.067061 | |
| 212 | 1 | m | -0.663788 | -0.677385 | 0.998447 | 1.505831 | |
| 212 | 1 | n | -0.701485 | -0.715708 | 0.999080 | 1.994759 | (**** |
| 212 | 2 | a | -0.553674 | -0.556193 | 0.999956 | 1.510422 | |
| 212 | 2 | b | -0.536118 | -0.537247 | 0.999990 | 1.407011 | |
| 212 | 2 | c | -0.560078 | -0.562278 | 0.999967 | 1.525915 | |
| 212 | 2 | d | -0.683127 | -0.679519 | 0.995743 | -0.261418 | |
| 212 | 2 | e | -0.288411 | -0.327933 | 0.991660 | 1.554373 | |
| 212 | 2 | f | -0.681729 | -0.676123 | 0.995372 | -0.387514 | |
| 212 | 2 | g | -0.692679 | -0.688354 | 0.995545 | -0.309736 | |
| 212 | 2 | h | 0.055268 | 0.052574 | 0.999918 | 1.030669 | |
| 212 | 2 | j | -0.685346 | -0.684692 | 0.998036 | -0.070164 | |
| 212 | 2 | l | 0.004343 | 0.004002 | 0.999999 | 1.006818 | |
| 212 | 2 | m | -0.710908 | -0.707554 | 0.996714 | -0.286978 | |
| 212 | 2 | n | -0.731150 | -0.726278 | 0.997792 | -0.520132 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

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Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predicaticns of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## ADVERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 219 | 1 | a | -0.331415 | -0.331750 | 0.999978 | 0.212136 | |
| 219 | 1 | d | -0.431196 | -0.457892 | 0.993178 | 1.002152 | |
| 219 | 1 | e | -0.001101 | -0.001101 | 1.000000 | 0.000000 | |
| 219 | 1 | h | -0.738016 | -0.728622 | 0.999181 | -1.252895 | |
| 219 | 1 | j | -0.671656 | -0.679750 | 0.999325 | 1.128190 | |
| 219 | 1 | m | -0.541866 | -0.557848 | 0.997718 | 1.094262 | |
| 219 | 1 | n | -0.562968 | -0.578395 | 0.998266 | 1.217319 | |
| 219 | 2 | a | -0.253123 | -0.254585 | 0.999933 | 0.519852 | |
| 219 | 2 | b | -0.223322 | -0.224152 | 0.999984 | 0.606919 | |
| 219 | 2 | c | -0.264359 | -0.265601 | 0.999944 | 0.486586 | |
| 219 | 2 | d | -0.395491 | -0.423484 | 0.992759 | 1.004290 | |
| 219 | 2 | e | -0.001101 | -0.001101 | 1.000000 | 0.000000 | |
| 219 | 2 | f | -0.380616 | -0.409756 | 0.991021 | 0.935396 | |
| 219 | 2 | g | -0.404803 | -0.432203 | 0.992215 | 0.953313 | |
| 219 | 2 | h | -0.769917 | -0.767515 | 0.999397 | -0 428214 | |
| 219 | 2 | j | -0.594641 | -0.600761 | 0.999318 | 0.808325 | |
| 219 | 2 | l | -0.616435 | -0.615349 | 0.999353 | -0.153117 | |
| 219 | 2 | m | -0.504693 | -0.518620 | 0.997799 | 0.955362 | |
| 219 | 2 | n | -0.520418 | -0.532008 | 0.998432 | 0.950606 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### ADVERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 221 | 1 | a | 0.044923 | 0.044756 | 0.999961 | 0.071199 | |
| 221 | 1 | d | 0.075409 | 0.068418 | 0.999671 | 1.021262 | |
| 221 | 1 | e | -0.000885 | -0.000885 | 1.000000 | 0.000000 | |
| 221 | 1 | h | -0.034912 | -0.034912 | 1.000000 | 0.000000 | |
| 221 | 1 | j | -0.072548 | -0.078012 | 0.999855 | 1.204255 | |
| 221 | 1 | m | 0.012463 | 0.006072 | 0.999766 | 1.105415 | |
| 221 | 1 | n | -0.082838 | -0.085460 | 0.999962 | 1.131846 | |
| 221 | 2 | a | 0.035569 | 0.035454 | 0.999933 | 0.037527 | |
| 221 | 2 | b | 0.024068 | 0.023727 | 0.999973 | 0.173684 | |
| 221 | 2 | c | 0.035314 | 0.035149 | 0.999942 | 0.057249 | |
| 221 | 2 | d | 0.040988 | 0.039240 | 0.999922 | 0.524472 | |
| 221 | 2 | e | -0.000885 | -0.000885 | 1.000000 | 0.000000 | |
| 221 | 2 | f | -0.003799 | -0.004296 | 0.999986 | 0.347925 | |
| 221 | 2 | g | 0.035177 | 0.033652 | 0.999936 | 0.505707 | |
| 221 | 2 | h | -0.034210 | -0.034210 | 1.000000 | 0.000000 | |
| 221 | 2 | j | -0.066140 | -0.067458 | 0.999979 | 0.754856 | |
| 221 | 2 | l | -0.001531 | -0.001531 | 1.000000 | 0.000000 | |
| 221 | 2 | m | -0.013498 | -0.014859 | 0.999966 | 0.617133 | |
| 221 | 2 | n | -0.092854 | -0.093602 | 0.999993 | 0.738241 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## ADVERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 222 | 1 | a | -0.065303 | -0.065303 | 1.000000 | 0.000000 | |
| 222 | 1 | d | -0.407137 | -0.407137 | 1.000000 | 0.000000 | |
| 222 | 1 | e | -0.000884 | -0.000884 | 1.000000 | 0.000000 | |
| 222 | 1 | h | -0.182421 | -0.182421 | 1.000000 | 0.000000 | |
| 222 | 1 | j | -0.403934 | -0.403934 | 1.000000 | 0.000000 | |
| 222 | 1 | m | -0.430564 | -0.430564 | 1.000000 | 0.000000 | |
| 222 | 1 | n | -0.194080 | -0.194080 | 1.000000 | 0.000000 | |
| 222 | 2 | a | -0.076259 | -0.076259 | 1.000000 | 0.000000 | |
| 222 | 2 | b | -0.063133 | -0.063133 | 1.000000 | 0.000000 | |
| 222 | 2 | c | -0.073564 | -0.073564 | 1.000000 | 0.000000 | |
| 222 | 2 | d | -0.410846 | -0.410846 | 1.000000 | 0.000000 | |
| 222 | 2 | e | -0.000884 | -0.000884 | 1.000000 | 0.000000 | |
| 222 | 2 | f | -0.338840 | -0.338840 | 1.000000 | 0.000000 | |
| 222 | 2 | g | -0.410581 | -0.410581 | 1.000000 | 0.000000 | |
| 222 | 2 | h | -0.022308 | -0.022308 | 1.000000 | 0.000000 | |
| 222 | 2 | j | -0.430670 | -0.430670 | 1.000000 | 0.000000 | |
| 222 | 2 | i | -0.002454 | -0.002454 | 1.000000 | 0.000000 | |
| 222 | 2 | m | -0.442443 | -0.442443 | 1.000000 | 0.000000 | |
| 222 | 2 | n | -0.256865 | -0.256865 | 1.000000 | 0.000000 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### ADVERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 223 | 1 | a | -0.732594 | -0.732594 | 1.000000 | 0.000000 | |
| 223 | 1 | d | -0.694873 | -0.689378 | 0.999583 | -0.940315 | |
| 223 | 1 | e | -0.000648 | -0.000648 | 1.000000 | 0.000000 | |
| 223 | 1 | h | -0.373036 | -0.373061 | 1.000000 | 0.175582 | |
| 223 | 1 | j | -0.422509 | -0.427477 | 0.999156 | 0.497421 | |
| 223 | 1 | m | -0.695676 | -0.699367 | 0.998016 | 0.304605 | |
| 223 | 1 | n | -0.639829 | -0.646247 | 0.997095 | 0.408513 | |
| 223 | 2 | a | -0.754136 | -0.754136 | 1.000000 | 0.000000 | |
| 223 | 2 | b | -0.718551 | -0.718551 | 1.000000 | 0.000000 | |
| 223 | 2 | c | -0.752835 | -0.752835 | 1.000000 | 0.000000 | |
| 223 | 2 | d | -0.732325 | -0.729744 | 0.999907 | -0.979208 | |
| 223 | 2 | e | -0.000648 | -0.000648 | 1.000000 | 0.000000 | |
| 223 | 2 | f | -0.709220 | -0.707628 | 0.999940 | -0.745860 | |
| 223 | 2 | g | -0.731842 | -0.729464 | 0.999921 | -0.979905 | |
| 223 | 2 | h | -0.361158 | -0.361454 | 0.999987 | 0.231277 | |
| 223 | 2 | j | -0.389875 | -0.391907 | 0.999764 | 0.379268 | |
| 223 | 2 | l | -0.315803 | -0.316129 | 0.999994 | 0.357899 | |
| 223 | 2 | m | -0.726692 | -0.729550 | 0.999522 | 0.497603 | |
| 223 | 2 | n | -0.670259 | -0.674251 | 0.999297 | 0.530942 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## ADVERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 227 | 1 | a | -0.128573 | -0.128573 | 1.000000 | 0.000000 | |
| 227 | 1 | c | -0.321199 | -0.398033 | 0.972933 | 1.550742 | |
| 227 | 1 | e | -0.000658 | -0.000658 | 1.000000 | 0.000000 | |
| 227 | 1 | h | 0.333390 | 0.335310 | 0.990081 | -0.064722 | |
| 227 | 1 | j | 0.059223 | -0.073285 | 0.967392 | 2.334452 | <**** |
| 227 | 1 | m | -0.227812 | -0.334139 | 0.967161 | 1.901058 | |
| 227 | 1 | n | -0.061523 | -0.214835 | 0.948281 | 2.156459 | <**** |
| 227 | 2 | a | -0.122705 | -0.122705 | 1.000000 | 0.000000 | |
| 227 | 2 | b | -0.133699 | -0.133699 | 1.000000 | 0.000000 | |
| 227 | 2 | c | -0.126353 | -0.126353 | 1.000000 | 0.000000 | |
| 227 | 2 | d | -0.288205 | -0.350143 | 0.978771 | 1.400076 | |
| 227 | 2 | e | -0.000658 | -0.000658 | 1.000000 | 0.000000 | |
| 227 | 2 | f | -0.202278 | -0.333198 | 0.980243 | 1.193629 | |
| 227 | 2 | g | -0.290104 | -0.351318 | 0.978304 | 1.370179 | |
| 227 | 2 | h | 0.331148 | 0.332918 | 0.997980 | -0.131987 | |
| 227 | 2 | j | 0.023736 | -0.085362 | 0.975891 | 2.231344 | <**** |
| 227 | 2 | k | 0.037912 | 0.089832 | 0.987456 | -1.469408 | |
| 227 | 2 | m | -0.214012 | -0.297705 | 0.975253 | 1.720195 | |
| 227 | 2 | n | -0.266552 | -0.199129 | 0.956814 | 2.037332 | <**** |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### ADVERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 230 | 1 | a | -0.373570 | -0.373570 | 1.000000 | 0.000000 | |
| 230 | 1 | d | -0.251948 | -0.269100 | 0.996351 | 0.902719 | |
| 230 | 1 | e | -0.000600 | -0.000600 | 1.000000 | 0.000000 | |
| 230 | 1 | h | 0.076769 | 0.076110 | 0.999996 | 1.031122 | |
| 230 | 1 | j | 0.058008 | 0.044673 | 0.998714 | 1.147541 | |
| 230 | 1 | m | -0.102239 | -0.148149 | 0.978426 | 0.970751 | |
| 230 | 1 | n | -0.169797 | -0.198683 | 0.990710 | 0.937975 | |
| 230 | 2 | a | -0.305620 | -0.305620 | 1.000000 | 0.000000 | |
| 230 | 2 | b | -0.234657 | -0.234657 | 1.000000 | 0.000000 | |
| 230 | 2 | c | -0.301274 | -0.301274 | 1.000000 | 0.000000 | |
| 230 | 2 | d | -0.197532 | -0.206214 | 0.999202 | 0.964329 | |
| 230 | 2 | e | -0.000600 | -0.000600 | 1.000000 | 0.000000 | |
| 230 | 2 | f | -0.149564 | -0.153486 | 0.999852 | 1.003149 | |
| 230 | 2 | g | -0.196159 | -0.204202 | 0.999332 | 0.975792 | |
| 230 | 2 | h | 0.064555 | 0.061481 | 0.999915 | 1.028799 | |
| 230 | 2 | j | 0.074391 | 0.062550 | 0.998378 | 0.908082 | |
| 230 | 2 | l | 0.073664 | 0.072332 | 0.999965 | 0.697923 | |
| 230 | 2 | m | -0.075132 | -0.092989 | 0.995770 | 0.849063 | |
| 230 | 2 | n | -0.137167 | -0.148515 | 0.998314 | 0.859593 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### ADVERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 235 | 1 | a | -0.031123 | -0.031123 | 1.000000 | 0.000000 | |
| 235 | 1 | c | -0.329375 | -0.360922 | 0.997923 | 2.113196 | <**** |
| 235 | 1 | e | -0.000931 | -0.000931 | 1.000000 | 0.000000 | |
| 235 | 1 | h | -0.094045 | -0.099305 | 0.998099 | 0.363568 | |
| 235 | 1 | j | -0.506407 | -0.546140 | 0.994535 | 1.758145 | |
| 235 | 1 | m | -0.397157 | -0.434698 | 0.996979 | 2.105674 | <**** |
| 235 | 1 | n | -0.457890 | -0.494441 | 0.996343 | 1.915425 | |
| 235 | 2 | a | -0.160684 | -0.160684 | 1.000000 | 0.000000 | |
| 235 | 2 | b | -0.226216 | -0.226216 | 1.000000 | 0.000000 | |
| 235 | 2 | c | -0.155708 | -0.155708 | 1.000000 | 0.000000 | |
| 235 | 2 | d | -0.361740 | -0.371986 | 0.999068 | 1.068200 | |
| 235 | 2 | e | -0.000931 | -0.000931 | 1.000000 | 0.000000 | |
| 235 | 2 | f | -0.412523 | -0.409704 | 0.999308 | -0.351968 | |
| 235 | 2 | g | -0.362648 | -0.369926 | 0.999186 | 0.816485 | |
| 235 | 2 | h | -0.126989 | -0.127378 | 0.999892 | 0.113158 | |
| 235 | 2 | j | -0.453489 | -0.472193 | 0.998358 | 1.498533 | |
| 235 | 2 | l | -0.014128 | -0.014163 | 0.999999 | 0.094714 | |
| 235 | 2 | m | -0.403257 | -0.414596 | 0.998859 | 1.085507 | |
| 235 | 2 | n | -0.434261 | -0.444998 | 0.998627 | 0.953844 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### ADVERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 248 | 1 | a | -0.174181 | -0.171062 | 0.999898 | -0.990842 | |
| 248 | 1 | d | -0.376324 | -0.405021 | 0.997801 | 1.972311 | (**** |
| 248 | 1 | e | -0.001000 | -0.001000 | 1.000000 | 0.000000 | |
| 248 | 1 | h | -0.209710 | -0.209715 | 1.000000 | 2.047406 | (**** |
| 248 | 1 | j | -0.240205 | -0.245887 | 0.999913 | 1.947197 | |
| 248 | 1 | m | -0.384995 | -0.405509 | 0.998981 | 2.096243 | (**** |
| 248 | 1 | n | -0.315971 | -0.335770 | 0.999108 | 2.135462 | (**** |
| 248 | 2 | a | -0.162555 | -0.158754 | 0.999855 | -1.010935 | |
| 248 | 2 | b | -0.162328 | -0.150639 | 0.999969 | -0.978255 | |
| 248 | 2 | c | -0.165652 | -0.162231 | 0.999882 | -1.006056 | |
| 248 | 2 | d | -0.388644 | -0.414537 | 0.998551 | 2.206564 | (**** |
| 248 | 2 | e | -0.001000 | -0.001000 | 1.000000 | 0.000000 | |
| 248 | 2 | f | -0.387811 | -0.410657 | 0.998757 | 2.113281 | (**** |
| 248 | 2 | g | -0.385112 | -0.411221 | 0.998479 | 2.174912 | (**** |
| 248 | 2 | h | -0.209574 | -0.209579 | 1.000000 | 1.967485 | (**** |
| 248 | 2 | j | -0.253679 | -0.257323 | 0.999970 | 2.113583 | (**** |
| 248 | 2 | l | -0.206419 | -0.206449 | 1.000000 | 1.938001 | |
| 248 | 2 | m | -0.426066 | -0.445533 | 0.999258 | 2.312804 | (**** |
| 248 | 2 | n | -0.348954 | -0.366078 | 0.999461 | 2.361162 | (**** |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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### A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## ADVERBS

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 252 | 1 | a | 0.087821 | 0.087821 | 1.000000 | 0.000000 | |
| 252 | 1 | d | 0.146321 | 0.152037 | 0.999355 | -0.682409 | |
| 252 | 1 | e | -0.000931 | -0.000931 | 1.000000 | 0.000000 | |
| 252 | 1 | h | 0.187661 | 0.191735 | 0.998957 | -0.385191 | |
| 252 | 1 | j | 0.209856 | 0.222346 | 0.995179 | -0.552108 | |
| 252 | 1 | m | 0.200105 | 0.204403 | 0.999706 | -0.766240 | |
| 252 | 1 | n | 0.253456 | 0.253736 | 0.999994 | -0.342848 | |
| 252 | 2 | a | 0.006594 | 0.006594 | 1.000000 | 0.000000 | |
| 252 | 2 | b | -0.029094 | -0.029094 | 1.000000 | 0.000000 | |
| 252 | 2 | c | 0.009133 | 0.009133 | 1.000000 | 0.000000 | |
| 252 | 2 | d | 0.188045 | 0.188014 | 0.999973 | 0.017908 | |
| 252 | 2 | e | -0.000931 | -0.000931 | 1.000000 | 0.000000 | |
| 252 | 2 | f | 0.095067 | 0.092604 | 0.999813 | 0.542856 | |
| 252 | 2 | g | 0.196328 | 0.195842 | 0.999955 | 0.222607 | |
| 252 | 2 | h | 0.024025 | 0.024478 | 0.999987 | -0.375015 | |
| 252 | 2 | j | 0.244992 | 0.248101 | 0.999548 | -0.452515 | |
| 252 | 2 | i | 0.000861 | 0.000896 | 1.000000 | -0.374171 | |
| 252 | 2 | m | 0.248129 | 0.248331 | 0.999918 | -0.068750 | |
| 252 | 2 | n | 0.295229 | 0.294360 | 0.999923 | 0.311041 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

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TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## DEFINITE ARTICLE

| Q | S | TW | Correlation Coefficients<br>$r_{ju}$ | <br>$r_{jr}$ | <br>$r_{ur}$ | Significance Level<br>Z | <br>p > .05 |
|---|---|---|---|---|---|---|---|
| 203 | 1 | a | -0.105343 | -0.106148 | 0.999980 | 0.553864 | |
| 203 | 1 | d | -0.141626 | -0.161493 | 0.991356 | 0.665910 | |
| 203 | 1 | e | -0.001022 | -0.001022 | 1.000000 | 0.000000 | |
| 203 | 1 | h | 0.117064 | 0.052089 | 0.985430 | 1.665079 | |
| 203 | 1 | j | 0.072857 | -0.013138 | 0.989212 | 2.558135 | (**** |
| 203 | 1 | m | -0.097276 | -0.148119 | 0.990305 | 1.600324 | |
| 203 | 1 | n | -0.012827 | -0.055864 | 0.994042 | 1.720215 | |
| 203 | 2 | a | -0.042574 | -0.043710 | 0.999964 | 0.582901 | |
| 203 | 2 | b | 0.005796 | 0.005370 | 0.999995 | 0.574551 | |
| 203 | 2 | c | -0.037613 | -0.038579 | 0.999974 | 0.585132 | |
| 203 | 2 | d | -0.070321 | -0.127871 | 0.981672 | 1.316604 | |
| 203 | 2 | e | -0.001022 | -0.001022 | 1.000000 | 0.000000 | |
| 203 | 2 | f | -0.036263 | -0.093124 | 0.981955 | 1.308198 | |
| 203 | 2 | g | -0.070989 | -0.130450 | 0.980511 | 1.319463 | |
| 203 | 2 | h | 0.069005 | 0.048481 | 0.995322 | 0.926427 | |
| 203 | 2 | j | 0.034705 | -0.052601 | 0.978173 | 1.826351 | |
| 203 | 2 | l | 0.002329 | 0.001232 | 0.999989 | 1.031834 | |
| 203 | 2 | m | -0.044468 | -0.129594 | 0.976002 | 1.701714 | |
| 203 | 2 | n | 0.004985 | -0.059381 | 0.984518 | 1.597165 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## DEFINITE ARTICLE

|  |  |  | Correlation Coefficients |  |  | Significance Level |  |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 207 | 1 | a | 0.089728 | 0.088733 | 0.999863 | 0.269908 |  |
| 207 | 1 | d | -0.006064 | -0.077743 | 0.962852 | 1.179090 |  |
| 207 | 1 | e | -0.000956 | -0.000956 | 1.000000 | 0.000000 |  |
| 207 | 1 | h | 0.213822 | 0.220392 | 0.999440 | -0.896748 |  |
| 207 | 1 | j | 0.168212 | 0.187751 | 0.998075 | -1.424611 |  |
| 207 | 1 | m | 0.099118 | 0.083089 | 0.987516 | 0.455556 |  |
| 207 | 1 | n | 0.064855 | 0.041813 | 0.977726 | 0.489005 |  |
| 207 | 2 | a | 0.069602 | 0.068528 | 0.999717 | 0.202447 |  |
| 207 | 2 | b | 0.054739 | 0.054262 | 0.999936 | 0.188977 |  |
| 207 | 2 | c | 0.070263 | 0.069245 | 0.999769 | 0.212202 |  |
| 207 | 2 | d | 0.021932 | -0.017484 | 0.971877 | 0.743697 |  |
| 207 | 2 | e | -0.000956 | -0.000956 | 1.000000 | 0.000000 |  |
| 207 | 2 | f | -0.040281 | -0.047937 | 0.971695 | 0.144053 |  |
| 207 | 2 | g | 0.018805 | -0.014957 | 0.972672 | 0.646113 |  |
| 207 | 2 | h | 0.202720 | 0.214014 | 0.998776 | -1.040205 |  |
| 207 | 2 | j | 0.193024 | 0.202776 | 0.999022 | -1.002807 |  |
| 207 | 2 | l | 0.175987 | 0.203602 | 0.979143 | -0.615540 |  |
| 207 | 2 | m | 0.121846 | 0.117138 | 0.989392 | 0.145574 |  |
| 207 | 2 | n | 0.098820 | 0.082496 | 0.983386 | 0.402153 |  |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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Appendix E-207

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## DEFINITE ARTICLE

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 212 | 1 | a | -0.532393 | -0.534533 | 0.999965 | 1.423618 | |
| 212 | 1 | d | -0.630979 | -0.638314 | 0.992509 | 0.379011 | |
| 212 | 1 | e | -0.281644 | -0.380416 | 0.964098 | 1.876376 | |
| 212 | 1 | h | 0.089775 | 0.084509 | 0.999889 | 1.732290 | |
| 212 | 1 | j | -0.592539 | -0.561817 | 0.993563 | -1.543675 | |
| 212 | 1 | m | -0.663788 | -0.650203 | 0.994932 | -0.860060 | |
| 212 | 1 | n | -0.701485 | -0.660807 | 0.993845 | -2.115928 | <**** |
| 212 | 2 | a | -0.553674 | -0.556193 | 0.999956 | 1.510422 | |
| 212 | 2 | b | -0.536118 | -0.537247 | 0.999990 | 1.407011 | |
| 212 | 2 | c | -0.560078 | -0.562278 | 0.999967 | 1.525915 | |
| 212 | 2 | d | -0.683127 | -0.663560 | 0.992462 | -1.025839 | |
| 212 | 2 | e | -0.288411 | -0.394990 | 0.969909 | 2.195630 | <**** |
| 212 | 2 | f | -0.681729 | -0.664523 | 0.990567 | -0.815818 | |
| 212 | 2 | g | -0.692679 | -0.671592 | 0.992099 | -1.086799 | |
| 212 | 2 | h | 0.055268 | 0.051919 | 0.999929 | 1.379969 | |
| 212 | 2 | j | -0.685346 | -0.655242 | 0.994465 | -1.726480 | |
| 212 | 2 | l | 0.004343 | 0.003938 | 0.999999 | 1.336510 | |
| 212 | 2 | m | -0.710908 | -0.682914 | 0.993353 | -1.538147 | |
| 212 | 2 | n | -0.731150 | -0.693535 | 0.993167 | -1.959042 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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Page

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## DEFINITE ARTICLE

|  |  |  | Correlation Coefficients |  |  | Significance Level |  |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 219 | 1 | a | -0.331415 | -0.331415 | 1.000000 | 0.000000 |  |
| 219 | 1 | d | -0.431196 | -0.458912 | 0.994957 | 1.200153 |  |
| 219 | 1 | e | -0.001101 | -0.001101 | 1.000000 | 0.000000 |  |
| 219 | 1 | h | -0.738016 | -0.739108 | 0.999833 | 0.352359 |  |
| 219 | 1 | j | -0.671656 | -0.674625 | 0.998730 | 0.317383 |  |
| 219 | 1 | m | -0.541866 | -0.555294 | 0.996965 | 0.809469 |  |
| 219 | 1 | n | -0.562968 | -0.576185 | 0.997133 | 0.831686 |  |
| 219 | 2 | a | -0.253123 | -0.253123 | 1.000000 | 0.000000 |  |
| 219 | 2 | b | -0.223322 | -0.223322 | 1.000000 | 0.000000 |  |
| 219 | 2 | c | -0.264359 | -0.264359 | 1.000000 | 0.000000 |  |
| 219 | 2 | d | -0.395491 | -0.411132 | 0.992687 | 0.562857 |  |
| 219 | 2 | e | -0.001101 | -0.001101 | 1.000000 | 0.000000 |  |
| 219 | 2 | f | -0.380616 | -0.384239 | 0.991255 | 0.118603 |  |
| 219 | 2 | g | -0.404803 | -0.419032 | 0.992614 | 0.512025 |  |
| 219 | 2 | h | -0.769917 | -0.770346 | 0.999754 | 0.121066 |  |
| 219 | 2 | j | -0.594641 | -0.595432 | 0.997550 | 0.056217 |  |
| 219 | 2 | l | -0.616435 | -0.616531 | 0.999783 | 0.023530 |  |
| 219 | 2 | m | -0.504693 | -0.510413 | 0.995036 | 0.266190 |  |
| 219 | 2 | n | -0.520418 | -0.526431 | 0.995527 | 0.297916 |  |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

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Page

A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## DEFINITE ARTICLE

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 221 | 1 | a | 0.044923 | 0.044756 | 0.999961 | 0.071199 | |
| 221 | 1 | d | 0.075409 | 0.085339 | 0.972765 | -0.159731 | |
| 221 | 1 | e | -0.000885 | -0.000885 | 1.000000 | 0.000000 | |
| 221 | 1 | h | -0.034912 | -0.031620 | 0.999956 | -1.311737 | |
| 221 | 1 | j | -0.072548 | -0.048756 | 0.989701 | -0.621482 | |
| 221 | 1 | m | 0.012463 | 0.033271 | 0.980126 | -0.390667 | |
| 221 | 1 | n | -0.082838 | -0.054731 | 0.991137 | -0.791764 | |
| 221 | 2 | a | 0.035569 | 0.035454 | 0.999933 | 0.037527 | |
| 221 | 2 | b | 0.024068 | 0.023727 | 0.999973 | 0.173684 | |
| 221 | 2 | c | 0.035314 | 0.035149 | 0.999942 | 0.057249 | |
| 221 | 2 | d | 0.040988 | 0.021364 | 0.965358 | 0.279127 | |
| 221 | 2 | e | -0.000885 | -0.000885 | 1.000000 | 0.000000 | |
| 221 | 2 | f | -0.003799 | -0.038791 | 0.969275 | 0.528531 | |
| 221 | 2 | g | 0.035177 | 0.010157 | 0.962259 | 0.340917 | |
| 221 | 2 | h | -0.034210 | -0.032175 | 0.999985 | -1.368177 | |
| 221 | 2 | j | -0.066140 | -0.057768 | 0.989497 | -0.216570 | |
| 221 | 2 | l | -0.001531 | -0.001531 | 1.000000 | 0.000000 | |
| 221 | 2 | m | -0.013498 | -0.021055 | 0.980327 | 0.142565 | |
| 221 | 2 | n | -0.092854 | -0.082137 | 0.994236 | -0.374885 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

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### A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## DEFINITE ARTICLE

|  |  |  | Correlation Coefficients |  |  | Significance Level |  |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 222 | 1 | a | -0.065303 | -0.065303 | 1.000000 | 0.000000 |  |
| 222 | 1 | d | -0.407137 | -0.431149 | 0.950314 | 0.375593 |  |
| 222 | 1 | e | -0.000884 | -0.000884 | 1.000000 | 0.000000 |  |
| 222 | 1 | h | -0.182421 | -0.203050 | 0.993068 | 2.149988 | (**** |
| 222 | 1 | j | -0.403934 | -0.428106 | 0.954801 | 0.395615 |  |
| 222 | 1 | m | -0.430564 | -0.459139 | 0.950352 | 0.452993 |  |
| 222 | 1 | n | -0.194080 | -0.197124 | 0.986310 | 0.083897 |  |
| 222 | 2 | a | -0.076259 | -0.076259 | 1.000000 | 0.000000 |  |
| 222 | 2 | b | -0.063133 | -0.063133 | 1.000000 | 0.000000 |  |
| 222 | 2 | c | -0.073564 | -0.073564 | 1.000000 | 0.000000 |  |
| 222 | 2 | d | -0.410846 | -0.467872 | 0.951402 | 0.903768 |  |
| 222 | 2 | e | -0.000884 | -0.000884 | 1.000000 | 0.000000 |  |
| 222 | 2 | f | -0.338840 | -0.433130 | 0.951294 | 1.438793 |  |
| 222 | 2 | g | -0.410581 | -0.473168 | 0.952301 | 0.999968 |  |
| 222 | 2 | h | -0.022308 | -0.022024 | 0.999931 | -0.108190 |  |
| 222 | 2 | j | -0.430670 | -0.482421 | 0.961483 | 0.928051 |  |
| 222 | 2 | l | -0.002454 | -0.002454 | 1.000000 | 0.000070 |  |
| 222 | 2 | m | -0.442443 | -0.503002 | 0.951921 | 0.980138 |  |
| 222 | 2 | n | -0.256865 | -0.296653 | 0.984493 | 1.045795 |  |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## DEFINITE ARTICLE

|  |  |  | Correlation Coefficients |  |  | Significance Level |  |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 223 | 1 | a | -0.732534 | -0.732534 | 1.000000 | 0.000000 |  |
| 223 | 1 | d | -0.694873 | -0.597237 | 0.909762 | -1.089483 |  |
| 223 | 1 | e | -0.000648 | -0.000648 | 1.000000 | 0.000000 |  |
| 223 | 1 | h | -0.373036 | -0.413896 | 0.995578 | 1.684466 |  |
| 223 | 1 | j | -0.422509 | -0.450678 | 0.993062 | 0.975742 |  |
| 223 | 1 | m | -0.695676 | -0.612015 | 0.944864 | -1.181094 |  |
| 223 | 1 | n | -0.639829 | -0.543172 | 0.934936 | -1.192056 |  |
| 223 | 2 | a | -0.754136 | -0.754136 | 1.000000 | 0.000000 |  |
| 223 | 2 | b | -0.718551 | -0.718551 | 1.000000 | 0.000000 |  |
| 223 | 2 | c | -0.752835 | -0.752835 | 1.000000 | 0.000000 |  |
| 223 | 2 | d | -0.732325 | -0.654944 | 0.930620 | -1.038573 |  |
| 223 | 2 | e | -0.000648 | -0.000648 | 1.000000 | 0.000000 |  |
| 223 | 2 | f | -0.709220 | -0.658562 | 0.945831 | -0.775813 |  |
| 223 | 2 | g | -0.731842 | -0.655799 | 0.932187 | -1.032759 |  |
| 223 | 2 | h | -0.351158 | -0.383670 | 0.998772 | 1.747008 |  |
| 223 | 2 | j | -0.389875 | -0.401449 | 0.998356 | 0.813411 |  |
| 223 | 2 | l | -0.315803 | -0.324859 | 0.999795 | 1.707377 |  |
| 223 | 2 | m | -0.726692 | -0.667592 | 0.954746 | -0.985135 |  |
| 223 | 2 | n | -0.670259 | -0.586862 | 0.943080 | -1.137525 |  |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## DEFINITE ARTICLE

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 227 | 1 | a | -0.128573 | -0.128573 | 1.000000 | 0.000000 | |
| 227 | 1 | d | -0.321199 | -0.377591 | 0.925556 | 0.697176 | |
| 227 | 1 | e | -0.000658 | -0.000658 | 1.000000 | 0.000000 | |
| 227 | 1 | h | 0.333390 | 0.338081 | 0.990107 | -0.158368 | |
| 227 | 1 | j | 0.059223 | -0.001564 | 0.953721 | 0.895110 | |
| 227 | 1 | m | -0.227812 | -0.292655 | 0.911602 | 0.714758 | |
| 227 | 1 | n | -0.061523 | -0.123365 | 0.929369 | 0.739915 | |
| 227 | 2 | a | -0.122705 | -0.122705 | 1.000000 | 0.200000 | |
| 227 | 2 | b | -0.133699 | -0.133699 | 1.000000 | 0.000000 | |
| 227 | 2 | c | -0.126353 | -0.126353 | 1.000000 | 0.000000 | |
| 227 | 2 | d | -0.288205 | -0.354688 | 0.961845 | 1.128635 | |
| 227 | 2 | e | -0.000658 | -0.000658 | 1.000000 | 0.000000 | |
| 227 | 2 | f | -0.282278 | -0.336992 | 0.974451 | 1.130055 | |
| 227 | 2 | g | -0.290104 | -0.356649 | 0.962468 | 1.139455 | |
| 227 | 2 | h | 0.331148 | 0.336556 | 0.997301 | -0.348911 | |
| 227 | 2 | j | 0.023736 | -0.025261 | 0.972956 | 0.943011 | |
| 227 | 2 | l | 0.037912 | 0.094668 | 0.985453 | -1.492026 | |
| 227 | 2 | m | -0.214012 | -0.277742 | 0.956547 | 0.995203 | |
| 227 | 2 | n | -0.066552 | -0.120247 | 0.961141 | 0.865730 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

Correlation Coefficients: $r_{ju}$ is between the user's relevance judgment and the system's predicted relevance based on unresolved anaphors. $r_{jr}$ is between the user's relevance judgment and the system's predicted relevance based on resolved anaphors.

Because the user's judgments were scaled from low to high (1 = most relevant, 4 = most non-relevant) a strong negative correlation shows agreement between user's and system's relevance judgments.

Significance Level: A positive Z indicates that the second correlation is higher than the first correlation ($r_{jr} > r_{ju}$). If this Z is statistically significant as indicated by the asterisks, then resolving anaphors improves the system's predications of relevance.

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### DEFINITE ARTICLE

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 230 | 1 | a | -0.373570 | -0.373570 | 1.000000 | 0.000000 | |
| 230 | 1 | d | -0.251948 | -0.232470 | 0.938043 | -0.248792 | |
| 230 | 1 | e | -0.000600 | -0.000600 | 1.000000 | 0.000000 | |
| 230 | 1 | h | 0.076763 | 0.075902 | 0.999336 | 0.334578 | |
| 230 | 1 | j | 0.058008 | 0.045139 | 0.992559 | 0.460424 | |
| 230 | 1 | m | -0.102239 | -0.132519 | 0.924660 | 0.342555 | |
| 230 | 1 | n | -0.169797 | -0.182024 | 0.939215 | 0.155354 | |
| 230 | 2 | a | -0.305620 | -0.305620 | 1.000000 | 0.000000 | |
| 230 | 2 | b | -0.234657 | -0.234657 | 1.000000 | 0.000000 | |
| 230 | 2 | c | -0.301274 | -0.301274 | 1.000000 | 0.000000 | |
| 230 | 2 | d | -0.197532 | -0.187890 | 0.943602 | -0.127603 | |
| 230 | 2 | e | -0.000600 | -0.000600 | 1.000000 | 0.000000 | |
| 230 | 2 | f | -0.149564 | -0.141701 | 0.947459 | -0.106907 | |
| 230 | 2 | g | -0.196159 | -0.185741 | 0.942992 | -0.137083 | |
| 230 | 2 | h | 0.064555 | 0.060895 | 0.999806 | 0.810542 | |
| 230 | 2 | j | 0.074391 | 0.060171 | 0.994686 | 0.602574 | |
| 230 | 2 | l | 0.073664 | 0.071688 | 0.999834 | 0.473614 | |
| 230 | 2 | m | -0.075132 | -0.094402 | 0.953716 | 0.277135 | |
| 230 | 2 | n | -0.137167 | -0.149996 | 0.957739 | 0.194410 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC; 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## DEFINITE ARTICLE

|  |  |  | Correlation Coefficients |  |  | Significance Level |  |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 235 | 1 | a | -0.031123 | -0.031123 | 1.000000 | 0.000000 |  |
| 235 | 1 | c | -0.329375 | -0.285752 | 0.994152 | -1.755836 |  |
| 235 | 1 | e | -0.000931 | -0.000931 | 1.000000 | 0.000000 |  |
| 235 | 1 | h | -0.094045 | -0.057994 | 0.987647 | -0.975960 |  |
| 235 | 1 | j | -0.506407 | -0.483021 | 0.996102 | -1.251740 |  |
| 235 | 1 | m | -0.397157 | -0.362934 | 0.993628 | -1.360246 |  |
| 235 | 1 | n | -0.457890 | -0.430937 | 0.993811 | -1.124012 |  |
| 235 | 2 | a | -0.160684 | -0.160684 | 1.000000 | 0.000000 |  |
| 235 | 2 | b | -0.226216 | -0.226216 | 1.000000 | 0.000000 |  |
| 235 | 2 | c | -0.155708 | -0.155708 | 1.000000 | 0.000000 |  |
| 235 | 2 | d | -0.361740 | -0.309087 | 0.991218 | -1.740057 |  |
| 235 | 2 | e | -0.000931 | -0.000931 | 1.000000 | 0.000000 |  |
| 235 | 2 | f | -0.412523 | -0.358901 | 0.985995 | -1.437685 |  |
| 235 | 2 | g | -0.362648 | -0.300408 | 0.990090 | -1.690505 |  |
| 235 | 2 | h | -0.126965 | -0.117422 | 0.998917 | -0.877817 |  |
| 235 | 2 | j | -0.453489 | -0.413285 | 0.992495 | -1.491843 |  |
| 235 | 2 | i | -0.014128 | -0.013093 | 0.999987 | -0.872076 |  |
| 235 | 2 | m | -0.423257 | -0.351433 | 0.999886 | -1.619075 |  |
| 235 | 2 | n | -0.434261 | -0.386990 | 0.990077 | -1.512486 |  |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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Page

## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

## DEFINITE ARTICLE

| | | | Correlation Coefficients | | | Significance Level | |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | p > .05 |
| 248 | 1 | a | -0.174181 | -0.171062 | 0.999898 | -0.990842 | |
| 248 | 1 | d | -0.376824 | -0.378582 | 0.955880 | 0.028650 | |
| 248 | 1 | e | -0.001000 | -0.001000 | 1.000000 | 0.000000 | |
| 248 | 1 | h | -0.209710 | -0.209676 | 1.000000 | -0.427821 | |
| 248 | 1 | j | -0.240205 | -0.256509 | 0.997028 | 0.972292 | |
| 248 | 1 | m | -0.384995 | -0.414237 | 0.966508 | 0.550285 | |
| 248 | 1 | n | -0.315971 | -0.353847 | 0.975395 | 0.807042 | |
| 248 | 2 | a | -0.162555 | -0.158754 | 0.999855 | -1.010935 | |
| 248 | 2 | b | -0.162328 | -0.160639 | 0.999369 | -0.978255 | |
| 248 | 2 | c | -0.165652 | -0.162231 | 0.999882 | -1.006056 | |
| 248 | 2 | d | -0.388644 | -0.365281 | 0.939041 | -0.323601 | |
| 248 | 2 | e | -0.001000 | -0.001000 | 1.000000 | 0.000000 | |
| 248 | 2 | f | -0.387811 | -0.363248 | 0.932480 | -0.323157 | |
| 248 | 2 | g | -0.385112 | -0.358866 | 0.934999 | -0.351281 | |
| 248 | 2 | h | -0.209574 | -0.209563 | 1.000000 | -0.157523 | |
| 248 | 2 | j | -0.253679 | -0.262218 | 0.997347 | 0.541879 | |
| 248 | 2 | l | -0.206419 | -0.206416 | 1.000000 | -0.022628 | |
| 248 | 2 | m | -0.426066 | -0.422344 | 0.952376 | -0.059719 | |
| 248 | 2 | n | -0.348954 | -0.359561 | 0.968009 | 0.200703 | |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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## A Statistical Comparison of the Relationship Between Unresolved Anaphors and User's Relevance Judgments with Resolved Anaphors and User's Relevance Judgments: for Anaphoric Class

### DEFINITE ARTICLE

|  |  |  | Correlation Coefficients |  |  | Significance Level |  |
|---|---|---|---|---|---|---|---|
| Q | S | TW | $r_{ju}$ | $r_{jr}$ | $r_{ur}$ | Z | $p > .05$ |
| 252 | 1 | a | 0.087821 | 0.087821 | 1.000000 | 0.000000 |  |
| 252 | 1 | d | 0.146321 | 0.283660 | 0.971175 | -2.443995 | (**** |
| 252 | 1 | e | -0.000931 | -0.000931 | 1.000000 | 0.000000 |  |
| 252 | 1 | h | 0.187661 | 0.229938 | 0.989385 | -1.252583 |  |
| 252 | 1 | j | 0.209856 | 0.328685 | 0.980117 | -2.534868 | (**** |
| 252 | 1 | m | 0.200105 | 0.325146 | 0.976233 | -2.448122 | (**** |
| 252 | 1 | n | 0.253456 | 0.326274 | 0.987219 | -1.968003 | (**** |
| 252 | 2 | a | 0.006594 | 0.006594 | 1.000000 | 0.000000 |  |
| 252 | 2 | b | -0.029094 | -0.029094 | 1.000000 | 0.000000 |  |
| 252 | 2 | c | 0.009133 | 0.009133 | 1.000000 | 0.000000 |  |
| 252 | 2 | d | 0.128045 | 0.341037 | 0.956129 | -2.226513 | (**** |
| 252 | 2 | e | -0.000931 | -0.000931 | 1.000000 | 0.000000 |  |
| 252 | 2 | f | 0.095067 | 0.282277 | 0.927175 | -2.118646 | (**** |
| 252 | 2 | g | 0.196328 | 0.355381 | 0.949463 | -2.164196 | (**** |
| 252 | 2 | h | 0.024025 | 0.029704 | 0.999870 | -1.493036 |  |
| 252 | 2 | j | 0.244992 | 0.352520 | 0.977306 | -2.174153 | (**** |
| 252 | 2 | l | 0.000861 | 0.001121 | 1.000000 | -1.124364 |  |
| 252 | 2 | m | 0.248129 | 0.375791 | 0.966095 | -2.122799 | (**** |
| 252 | 2 | n | 0.295229 | 0.358758 | 0.987346 | -1.746842 |  |

NOTES:

Q: Queries 100-199 were searched on INSPEC: 200-299 on PsychINFO

S: Similarity Measure: #1 = Cosine. #2 = Dice

TW: Term Weighting Schemes: See Result Page R-1

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# APPENDIX F

## Summaries of Statistical Results, INSPEC and PsycABS

Summary of Statistical Results
By INSPEC Query

| INSPEC Query | Similarity Measure and Term Weighting | | | | | | | | | | | | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1A | 1D | 1E | 1H | 1J | 1M | 1N | 2A | 2B | 2C | 2D | 2E | 2F | 2G | 2H | 2J | 2L | 2M | 2N | + /- |
| 101 | | | | | | | | | | | | | | | | | | | -J | 0/-1 |
| 103 | | $C_{-J}$ | | | | $C_{-J}$ | $C_{-J}$ | | | | | | C | C | | | | C | C | 7/-3 |
| 104 | | | | | -J | | | | | | | | | | | -J | | -J | -J | 0/-4 |
| 107 | | | | | | | | | | | | | | | | $J_R$ | | | | 2/-0 |
| 109 | | | | | $-B_{-F}$ | -G | -G | | | | | | | | -B | $-E_{-G}$ | | -G | -G | 0/-9 |
| 135 | | | | | | | -F | | | | | | | | | | | | | 0/-1 |
| 142 | | | | | | | | | | | | | | | | | | | | 0/0 |
| 158 | | | | | | | | | | | | | | | D,E,<br>F,G,<br>H,I | | | | | 6/0 |
| 170 | | $-R_{-B}$ | | | -B | $-R_{-B}$ | -B | | | | -B | | -B | -B | J | -B | | -B | $-B_J$ | 2/-12 |
| 160 | | | | R | | | | | | | F | | $D_F$ | F | | | | E,F,<br>H,I | | 9/0 |
| 182 | | | | | | | | | | | | | | | | | | | | 0/0 |
| 184 | | | | | | | | | | | | | | | | | | | | 0/0 |
| Total + /- | 0/0 | 1/-3 | 0/0 | 1/0 | 0/-4 | 1/-4 | 1/-4 | 0/0 | 0/0 | 0/0 | 1/-1 | 0/0 | 3/-1 | 2/-1 | 7/-1 | 2/-4 | 0 0 | 5 -3 | 2 -4 | 26/-30 |

(Cell entries indicate the class of anaphor producing a statistically significant finding

Negative sign indicates that resolution decreases retrieval performance.

Summary of Statistical Results
- By Psychological Abstracts Query

| PsycINFO Query | Similarity Measure and Term Weighting | | | | | | | | | | | | | | | | | | | Total + /- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1A | 1B | 1E | 1H | 1J | 1M | 1N | 2A | 2B | 2C | 2D | 2E | 2F | 2G | 2H | 2J | 2L | 2M | 2N | |
| 203 | I,R | C | | I,R | I,J | I | I | I,R | I,R | I,R | I,R | | I,R | I,R | I | I,R | I | I,R | I,R | 29 /0 |
| 207 | | | | A | | | | | | | | | | | A | | | | | 2 /0 |
| 212 | | | A,B,<br>C | | | | M,-J<br>-R | | | | | A,B,<br>C,J,<br>R | | | G | | | | -R | 10 /-3 |
| 219 | | D | | | D | | | | | | C | | C | C | | | | C | C,D | 8 /0 |
| 221 | -I | A,R | | | A | A | A | -I | -I | -I | | | | | | | | | | 5 /-4 |
| 222 | -R | | | -J | | | | -R | -R | -R | | | | | | | | | | 0 /-5 |
| 223 | | | | | | | | | | | | | | | | | | | | 0 /0 |
| 227 | | | | | M | M | | | | | | | | | | M | | | M | 4 /0 |
| 230 | | -B -C | | | | -B | -B | | | | -B -C | | -C | -B -C | | | | -B | -B -C | 0 /-12 |
| 235 | | M | | B | | M | | | | | | | | | | | | | | 3 /0 |
| 248 | -E | M | | M | B | M | H | -E | -E | -E | H | | M | M | M | H | | M | M | 12 /-4 |
| 252 | | -C,J<br>-R | | | -C,J<br>-R | -C,J | J | E,F | E,F | E,F | J,-R | | J,-R | J,-R | -C | J,-R | | J | | 15 /-10 |
| Total + /- | 2/-3 | 7/-4 | 3/0 | 5/-1 | 7/-2 | 5/-2 | 6/-3 | 4/-3 | 4/-3 | 4/-3 | 5/-3 | 5/0 | 5/-2 | 5/-3 | 4/-1 | 5/-1 | 1/0 | 5/-1 | 6/-3 | 88 /-38 |

(Cell entries indicate the class of anaphor producing a statistically significant finding
Negative sign indicates that resolution decreases retrieval performance.)

Summary of Statistical Results
By INSPEC Query

| INSPEC Query | Similarity Measure and Term Weighting | | | | | | | | | | | | | | | | | | | Total + /- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1A | 1B | 1E | 1H | 1J | 1M | 1N | 2A | 2B | 2C | 2D | 2E | 2F | 2G | 2H | 2J | 2L | 2M | 2N | |
| 101 | | | | | | | | | | | | | | | | | | | -J | 0/-1 |
| 103 | | $C_{-J}$ | | | | $C_{-J}$ | $C_{-J}$ | | | | | | C | C | | | | C | C | 7/-3 |
| 104 | | | | | -J | | | | | | | | | | | -J | | -J | -J | 0/-4 |
| 107 | | | | | | | | | | | | | | | | $J_R$ | | | | 2/-0 |
| 109 | | | | | $-B_{-F}$ | -G | -G | | | | | | | | -B | $-E_{-G}$ | | -G | -G | 0/-9 |
| 135 | | | | | | | -F | | | | | | | | | | | | | 0/-1 |
| 142 | | | | | | | | | | | | | | | | | | | | 0/0 |
| 158 | | | | | | | | | | | | | | | D,E,<br>F,G,<br>H,I | | | | | 6/0 |
| 170 | | $-R_{-B}$ | | | -B | $-R_{-B}$ | -B | | | | -B | | -B | -B | J | -B | | -B | $-B_J$ | 2/-12 |
| 180 | | | | R | | | | | | | F | | $D_F$ | F | | | | E,F,<br>H,I | | 9/0 |
| 182 | | | | | | | | | | | | | | | | | | | | 0/0 |
| 184 | | | | | | | | | | | | | | | | | | | | 0/0 |
| Total + /- | 0/0 | 1/-3 | 0/0 | 1/0 | 0/-4 | 1/-4 | 1/-4 | 0/0 | 0/0 | 0/0 | 1/-1 | 0/0 | 3/-1 | 2/-1 | 7/-1 | 2/-4 | 0 0 | 5 -3 | 2 -4 | 26/-30 |

(Cell) entries indicate the class of anaphor producing a statistically significant finding

Negative sign indicates that resolution decreases retrieval performance.

Summary of Statistical Results
By Psychological Abstracts Anaphoric Class

| Anaphoric Class | Similarity Measure and Term Weighting | | | | | | | | | | | | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1A | 1D | 1E | 1H | 1J | 1M | 1N | 2A | 2B | 2C | 2D | 2E | 2F | 2G | 2H | 2J | 2L | 2M | 2N | + /- |
| A | | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | | 1 | | | | | 7 /-0 |
| B | | -1 | 1 | 1 | 1 | -1 | -1 | | | | -1 | | | -1 | | | | -1 | -1 | 3 /-7 |
| C | | $1_{-2}$ | 1 | | -1 | -1 | | | | | $1_{-1}$ | | $1_{-1}$ | $1_{-1}$ | -1 | | | 1 | $1_{-1}$ | 7 /-9 |
| D | | 1 | | | 1 | | | | | | | | | | | | | | 1 | 3 /-0 |
| E | -1 | | | | | | | $1_{-1}$ | $1_{-1}$ | $1_{-1}$ | | | | | | | | | | 3 /-4 |
| F | | | | | | | | 1 | 1 | 1 | | | | | | | | | | 3 /-0 |
| G | | | | | | | | | | | | | | | 1 | | | | | 1 /-0 |
| H | | 2 | | 1 | 1 | 2 | 3 | | | | 1 | | 1 | 1 | 1 | 2 | | 1 | 2 | 18 /-0 |
| I | $1_{-1}$ | | | 1 | 1 | 1 | 1 | $1_{-1}$ | $1_{-1}$ | $1_{-1}$ | 1 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 16 /-4 |
| J | | 1 | | -1 | 2 | 1 | $1_{-1}$ | | | | 1 | | 1 | 1 | | 1 | | 1 | | 10 /-2 |
| R | $1_{-1}$ | $1_{-1}$ | | 1 | -1 | | -1 | $1_{-1}$ | $1_{-1}$ | $1_{-1}$ | $1_{-1}$ | | $1_{-1}$ | $1_{-1}$ | | $1_{-1}$ | | 1 | $1_{-1}$ | 12 /-12 |
| Total + /- | 2/-3 | 7/-4 | 3/0 | 5/-1 | 7/-2 | 5/-2 | 6/-3 | 4/-3 | 4/-3 | 4/-3 | 5/-3 | 0/0 | 5/-2 | 5/-3 | 4/-1 | 5/-1 | 1/0 | 5/-1 | 6/-3 | 83 /-38 |

(Cell entries contain the number of PsycINFO queries with statistically significant findings.
Negative sign indicates that resolution decreases retrieval performance.)