Group differences in word use and meaning: a text analysis of the abstract word, 'Values'

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Abstract

People often use the same word while meaning very different things. Text analysis procedures can be applied to determine something of the meaning of words, typically from a single author. Rarely, however, have these procedures been used to explore the differences between individuals with different backgrounds and agendas, who nonetheless ostensibly claim to be talking about the same thing. In the current study, we explored the way in which an abstract word, 'values', was used by three interest groups in relation to the Wet Tropics World Heritage Area, in Australia. Documents about the Wet Tropics produced by three environmental organisations, involved in either research, management, or conservation activism, were compared for their use of the word 'values'. Using WordStat text processing software, distributional information in the localised sentence context (keyword frequencies by group and proximal co-occurrence) was explored for clues to differences in the applied meanings of 'values'. Type-token identities showed that vocabulary diversity was similar for all groups. Cluster analyses revealed group differences in word associations and conceptual themes surrounding 'values'. The research group tended towards operational terms, in contrast with the management group themes which related to links with Indigenous landowners and their cultural ties to the land, and conservation group themes which related to economics and community development. As examples of language 'slippage', keywords associated with 'values' showed that presence of the expression can predict connotations of economic worth (ECONOMIC, VALUE, RESOURCE), positive and negative attributions (QUALITY, POTENTIAL, THREAT), and physical substance (FOREST, SPECIES, HABITAT). Values are additionally associated with environmentally relevant behaviours (CONTROL, PROTECTION, MANAGEMENT). It is essential for effective communication and credible environmental science that such core terms and considerations as environmental 'values' convey clear and shared meanings.

Keywords: text analysis, meaning in use, vocabulary diversity, co-occurrence.

1. Introduction

Because the notion of 'values' is a core and fundamental psychological construct, and due to the escalating demands and uses of values as core construct, criterion [reference], and legislative, management, and political environmental focus, this word, construct and shared meaning domain is faltering. The word 'values' has an important status as the linguistic referent of a foundational construct relating to why people behave the way they do and how they 'should' behave (Kluckhohn & Strodtbeck, 1961; Schwartz, 1994). The construct and use of 'values' is also integral to the World Heritage Convention (UNESCO, 1972), and the status and management of World Heritage Areas such as the Wet Tropics World Heritage Area in Australia. Defining an area's 'values' in such a sense has consequences for determining what will be conserved, but how does one start to measure values if there is only a poor understanding of the term? The construct of 'values' has been hijacked and used in ever-more consequential ways with respect to environmental legislation, protection, politics, and management. There is a need for such core terms and constructs, in both 'pure' and

applied science, to be precisely specified and defined, and validly operationalised for consistent measurement (Reser & Bentrupperbäumer, 2005). This is not happening with respect to 'values' in the environmental domain (Bentrupperbäumer, Day, & Reser, 2006). Through text analyses of naturally occurring documents about the Wet Tropics, three environmental organisations (involved in research, management or conservation activism) were compared in their use of the word 'values'. Distributional information in the localised sentence context (keyword frequencies by group and proximal co-occurrence) was explored for clues to differences in the meanings of 'values'.

2. Method

English-language documents from the Research and Management groups included annual reports, newsletters, and information sheets, while the Conservation group documents consisted of a quarterly newsletter. Documents were accessed from online archives and searched for any instances of the letter string VALU. Text units, as localised sentence context, were formed using each sentence containing the letter string together with one sentence prior and one following. Where the following sentence also contained the letter string, the next sentence was included and so on.

The number of text units varied between the groups, with almost identical counts for the Management (85, M = 3.9, SD = 4.2) and Conservation (84, M = 4.7, SD = 2.5) samples, but a much higher count for the Research sample (225, M = 8.0, SD = 8.4), reflecting wordier documents from that group.

Word counts within the individual text units varied greatly across the groups, although the mean word counts for the text units were again very similar for the Management (M = 77.6, SD = 36.2) and Conservation (M = 78.1, SD = 41.8) samples, while the mean word count for text units was higher for the Research sample (M = 97.8, SD = 54.0).

Of the original occurrence count of 34,747 tokens in the 68 documents, 4,857 were unique types. The frequency for VALUES was 325, ranked at 10 in this sample. On the other end of the scale, 2,381 types occurred at a frequency of one.

3. Results

3.1. Vocabulary diversity

Vocabulary diversity was assessed via a type-token 'identity', which is the summed product of the type-token ratio (TTR) and the log type-token ratio (TTR'), and is suited for use with relatively small samples (Chen & Leimkuhler, 1989). The TTR for the whole sample was .1398. As this ratio is considered unstable for texts of different lengths, the more stable bilogarithmic type-token ratio was also calculated (TTR' = .8118). The sum of the two ratios, as a type-token 'identity', typically approximates 1.0, and the sum of the ratios for the current sample is consistent with this finding (TTR + TTR' = .95). Table 1 shows a comparison of the type-token relationships for the three group sub-samples together with ratios for the whole sample.

Document source[a]	V	T	TTR	TTR'	TTR+ TTR'
Management	1,332	6,492	0.21	0.82	1.02
Research	3,670	21,736	0.17	0.82	0.99
Conservation	1,895	6,519	0.29	0.86	1.15
Combined	4,857	34,747	0.14	0.81	0.95

Table 1: Type-token Relationships for the 68 Sample Documents and Three Group Sub-samples

Note. V = types; T = tokens; TTR = type/token ratio, V/T; TTR' = log type/token ratio, logV/logT.
[a]Management, n = 22; Research, n = 28; Conservation, n = 18

3.2. Cluster analyses

Function words were excluded and the remaining keywords were lemmatized for cluster analyses using WordStat text processing software. A keyword frequency threshold was set at a minimum of 15 occurrences. Hierarchical cluster analysis on all keywords and groups was performed using cosine theta, a normalised Euclidean distance measure, to illustrate how clusters of keywords are associated with each other or, alternatively, how independent they are from each other. Window size was set at a text unit (i.e. a pseudo-paragraph) to retain as much context as possible.

Cluster solutions are shown with keywords on the vertical axis and cluster formation on the horizontal axis. Similarity index scores closest to 1.0 indicate that keywords tend to appear together, and these are clustered earlier. Keywords tending not to appear together in paragraphs are clustered later, and have similarity index scores closer to zero. The order of keywords is not important for interpreting the graphs; object clusters are free to rotate around each other (Péladeau, 2003). Cluster formations remain the same while individual object positions can vary.

3.2.1. Management group clusters

While the five clusters outlined in Figure 1 do not form immediately recognisable themes, the 31 keywords in the Management cluster solution reflect two general, politically-driven themes: the role of the Indigenous owners and the role of the Management agency. The first and second clusters in particular reflect the important status of Australian Indigenous landowners and their role as co-managers of the Wet Tropics areas which they still inhabit. The third discrete cluster reflects the responsibilities of the management agency mandate to plan for and monitor activities within the protected area.

3.2.2. Research group clusters

From 136 keywords in the Research cluster solution, eleven discrete clusters are apparent. As shown in Figure 2, these represent the following themes: Research focus and Operationism; Time, Damage, and Flora and Fauna; Location and Environmental attributes; Level of interest and Reason for interest; and Economics and Outcomes. The relative wordiness of the Research group sub-sample makes it a richer source of context, which at the same time reveals many potential sources of confusion in how 'values' is understood, even within this one group. Note that the expression 'cultural values' appears with operational terms (cluster

3), and that there is a strong focus in the research group on natural resources, and thus on values understood as environmental attributes (cluster 7). It appears that for the research group, values are predominantly 'things in the forest', rather than shared human ideals, priorities, and concerns *about* human-natural environment relationships *in* the human landscape.

3.2.3. Conservation group clusters

The 24 keywords in the Conservation solution (Figure 3) form two main clusters. The first, similar to the Management group, has an Aboriginal issues theme, and the second reflects the Conservation group's acknowledgement that economic considerations are important for the protection of natural, environmental attributes, or 'values'. Close inspection of the source texts revealed that the keyword MILLION refers solely to dollar values in the Conservation group's contexts, and CAPE YORK is an area of northern Australia considered to be rich in mineral resources. In fact further inspection of the source texts revealed that the Conservation group is strategic in advancing awareness of economic considerations (dollar values) in order to promote protection and conservation of wildlife habitats and pristine landscapes (biophysical attributes as environmental values).

4. Conclusions

It appears likely that concerns for potential misunderstandings through communication slippage between individual environmental scientists, and between Wet Tropics management and stakeholders, are well-founded. Keywords associated with 'values' showed that the expression can carry connotations of commodity (ECONOMIC, VALUE, RESOURCE), positive and negative attributions (QUALITY, POTENTIAL, THREAT), and physical substance (FOREST, SPECIES, HABITAT). Values are additionally associated with environmentally relevant behaviours (CONTROL, PROTECTION, MANAGEMENT).

It would be misleading to assume that any word use or word association patterns found in the text analyses stem solely from group factors and differences. Differences are often, of course, found to be greater between individuals than between groups, and it is possible, and highly likely, that the expression 'values' is used and conceptualised in diverse ways even within the respective groups. Individuals build and draw on their own meaning systems according to experiences integrating language and the world. Individual understandings and uses of 'values' are thus influenced by myriad subtle factors relating to an individual's language and meaning system, cultural linguistic conventions, and specialised learning. In addition, there are multiple levels of use, meaning and communication taking place in any specific context. Idiographic approaches would undoubtedly uncover different aspects of use and meaning from those revealed here. In the interests of clarity, communicative effectiveness, and good science and sense, we really need clearer language of values as they relate to the natural environment, its monitoring and management, and its fundamental importance to humans.

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Figures

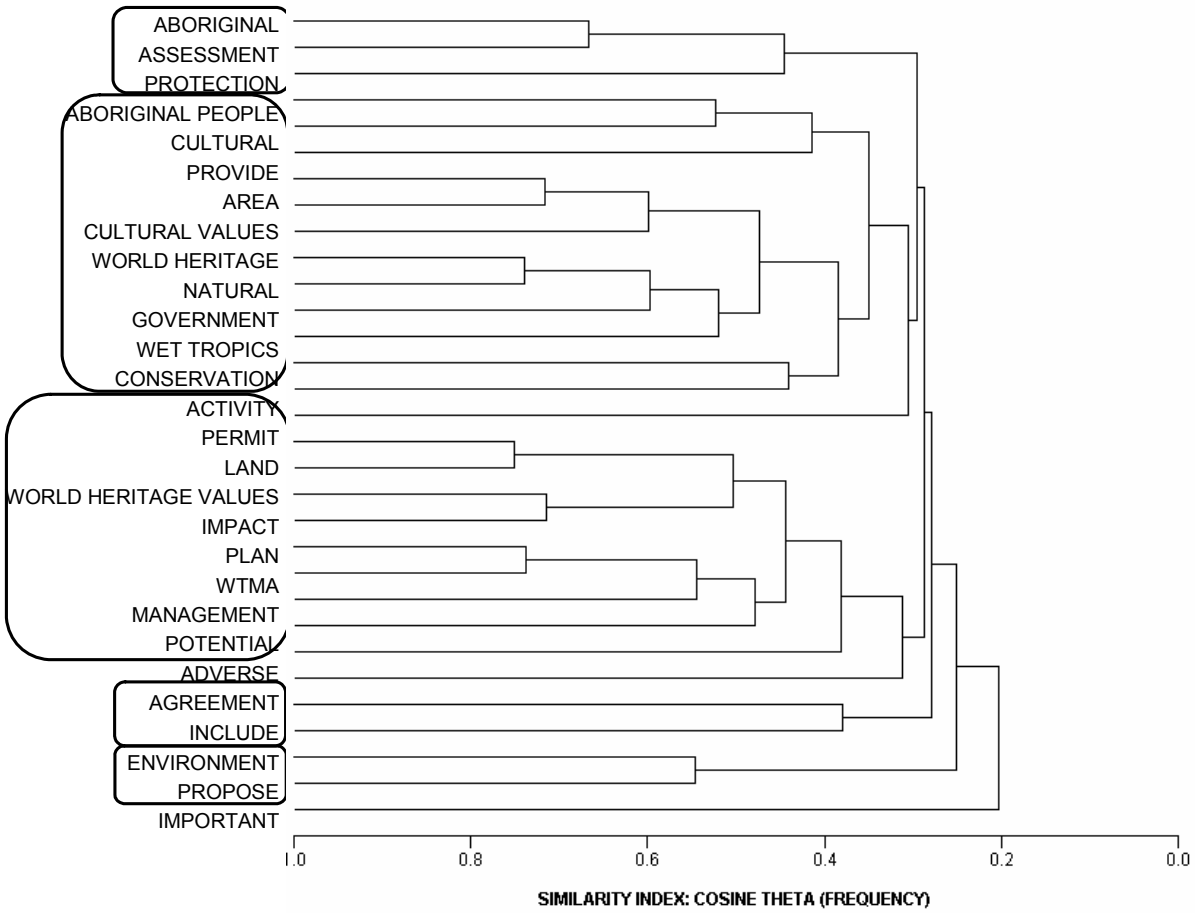
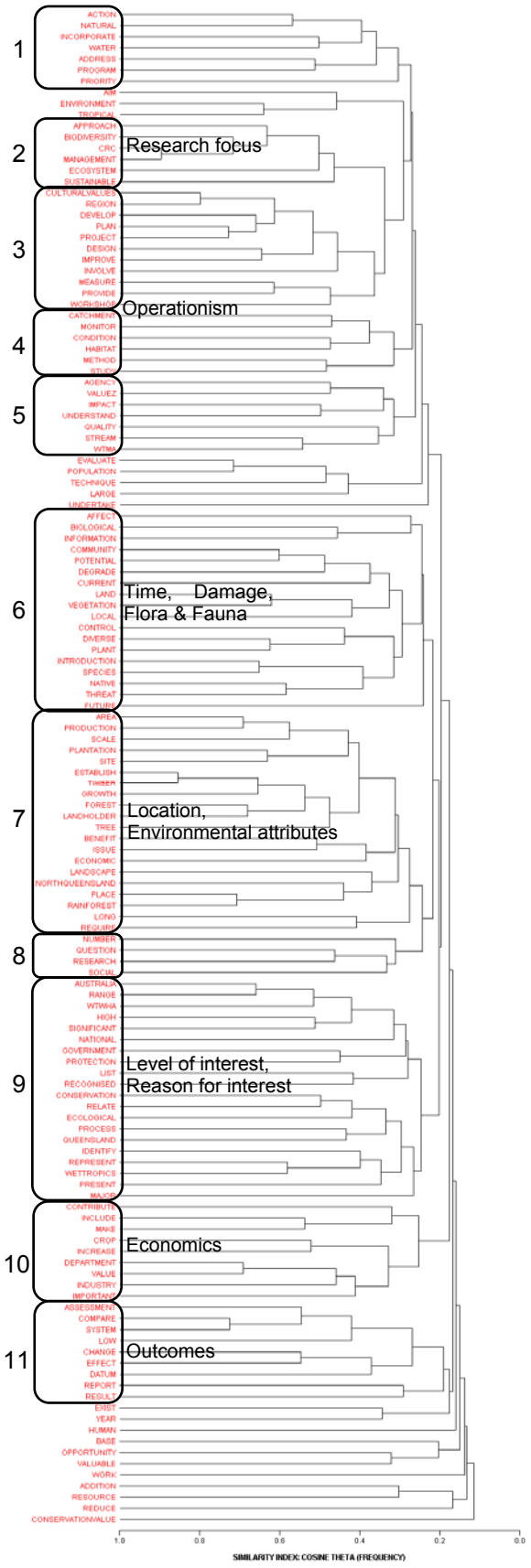


Figure 1. Keyword cluster solution for 31 keywords from the Management group sub-sample

Caption for Figure 2, following page

Figure 2. Keyword cluster solution for 136 keywords from the Research group sub-sample



ACTION 1
NATURAL
INCORPORATE
WATER
ADDRESS
PROGRAM
PRIORITY

APPROACH 2
BIODIVERSITY
CRC
MANAGEMENT
ECOSYSTEM
SUSTAINABLE

CULTURAL
VALUES
REGION
DEVELOP
PLAN 3
PROJECT
DESIGN
IMPROVE
INVOLVE
MEASURE
PROVIDE
WORKSHOP

CATCHMENT
MONITOR
CONDITION
HABITAT 4
METHOD
STUDY

AGENCY
VALUES 5
IMPACT
UNDERSTAND
QUALITY
STREAM
WTMA

AFFECT
BIOLOGICAL
INFORMATION
COMMUNITY
POTENTIAL
DEGRADE
CURRENT
LAND
VEGETATION
LOCAL
CONTROL
DIVERSE
PLANT
INTRODUCTIO
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SPECIES
NATIVE
THREAT
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PRODUCTION
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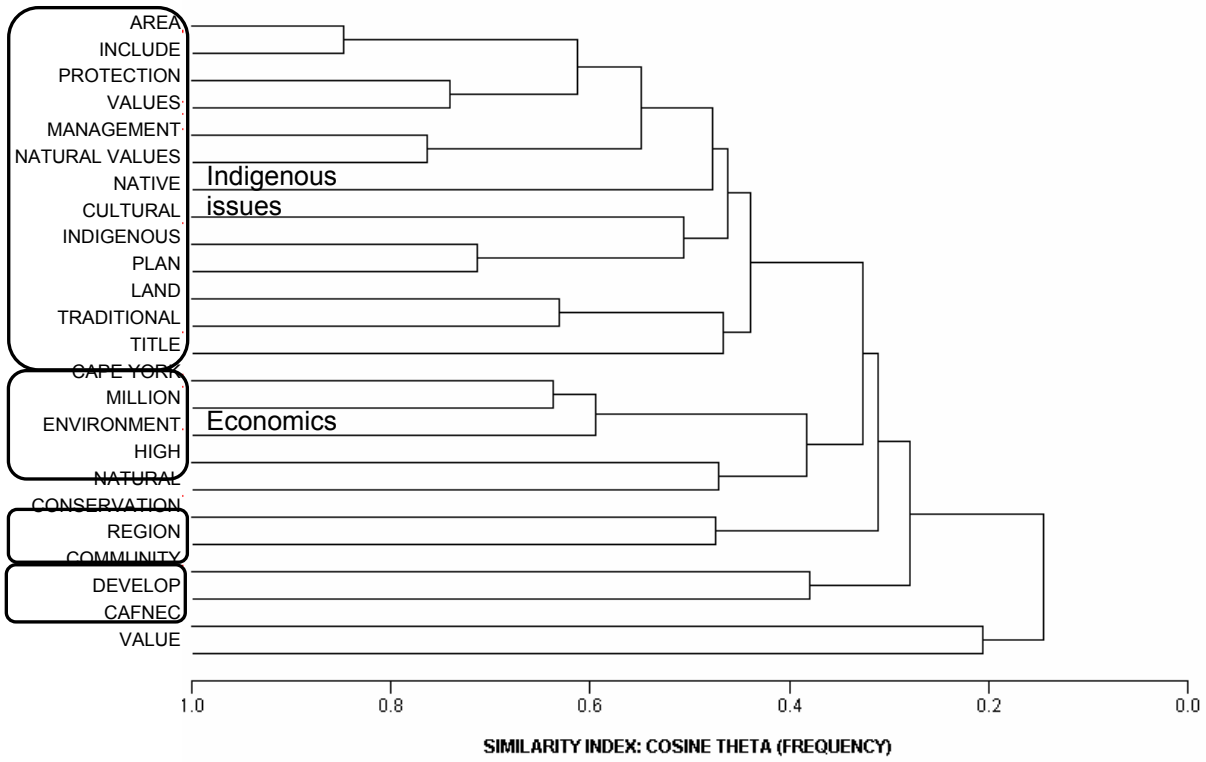

Figure 3. Keyword cluster solution for 24 keywords from the Conservation group sub-sample