Henrik Schärfe
Pascal Hitzler
Peter Øhrstrøm (Eds.)

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Conceptual Structures: Inspiration and Application

14th International Conference
on Conceptual Structures, ICCS 2006
Aalborg, Denmark, July 2006, Proceedings

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Lecture Notes in Artificial Intelligence 4068

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Preface

The 14th International Conference on Conceptual Structures (ICCS 2006) was held in Aalborg, Denmark during July 16 – 21, 2006.

Responding to the Call for Papers, we received 62 papers from 20 different countries, representing six different continents. This clearly indicates the international nature of the ICCS community as well as the widespread interest which was spawned by the previous conferences. By a thorough review process, 24 papers were selected to be included in this volume. In addition, six invited speakers made contributions which can be found in the first section of this volume.

The theme of ICCS 2006—Conceptual Structures: Inspiration and Application—points to a dual focus of interest that is also reflected in the constellation of papers. From the beginning of the planning of this conference, we focused on inspirational sources that have led to the current state of research in our community, by tracing important historical influences which daily effect work in representing knowledge and in handling representations of conceptual structures. At the same time, we also focused on ways in which these legacies are employed to further advance theory and practice in the field of knowledge representation and processing. With this volume, we believe that a valuable contribution to both aspects of this field is being made.

We wish to express our appreciation to all the authors of submitted papers, to the members of the Editorial Board and the Program Committee for all their work and valuable comments.

More information regarding the details of the conference can be found on the conference homepage at http://iccs-06.hum.aau.dk.

July 2006

Henrik Schärfe
Pascal Hitzler
Peter Øhrstrøm

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Organization

The International Conference on Conceptual Structures is the annual conference and principal research forum in the theory and practice of conceptual structures. Previous ICCS conferences were held at the Université Laval (Quebec City, 1993), at the University of Maryland (1994), at the University of California (Santa Cruuz, 1995), in Sidney, 1996), at the University of Washington (Seattle, 1997), in Montpellier (1998), at Virginia Tech (Blacksburg, 1999), at Darmstadt University of Technology (2000), at Stanford University (2001), at Borovets, Bulgaria (2002), at Dresden University of Technology (2003), at the University of Alabama (Huntsville, 2004), and at the University of Kassel (2005).

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Formal Ontology, Knowledge Representation and Conceptual Modelling: Old Inspirations, Still Unsolved Problems

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Abstract. According to the theme of ICCS 2006, I will revisit the old inspirations behind the development of modern knowledge representation and conceptual modelling techniques, showing how the recent results of formal ontological analysis can help addressing still unsolved problems, such as semantic interoperability and cognitive transparency.

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The Persuasive Expansion - Rhetoric, Information Architecture, and Conceptual Structure

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1 Introduction

Conceptual structures are, as a rule, approached from logical perspectives in a broad sense. However, since Antiquity there has been another approach to conceptual structures in thought and language, namely the rhetorical tradition. The relationship between these two grand traditions of Western Thought, Logic and Rhetoric, is complicated and sometimes uneasy – and yet, both are indispensable, as it would seem. Certainly, a (supposedly) practical field such as Information Architecture bears witness to the fact that for those who actually strive to work out IT systems conceptually congenial to human users, rhetorical and logical considerations intertwine in an almost inextricable manner.

While this paper shows that Rhetoric forms an obvious communication theory for Information Architecture, it will not deal with the questions of how to utilize this insight in concrete practise. The focus is on how Information Architecture (IA) and Rhetoric meet in what is in essence a common conceptual structure. I shall describe the basic concepts of classical rhetoric and then proceed to show how these fit most closely to the main concepts of Information Architecture. Specifically, the "Information Architecture Iceberg" model of Morville and Rosenfeld can be shown to have a predecessor in Cicero's considerations on *oratio* (speeches). Then an important current development, in this paper called the *Persuasive Expansion,* is examined with an emphasis on its implications with respect to IA and Rhetoric. Finally, and most strikingly of all, perhaps, it is suggested how the "hard" computer science paradigm of object orientation is rooted in the Topics of Rhetoric. The paper is concluded by a brief discussion of implications for Conceptual Structures and raising a vision of a *Computer Rhetoric.*

In discussing Rhetoric I shall follow what has become standard usage in textbooks on classical rhetoric and use both Greek and Latin terms. This is partly to make the terms more readily recognisable, but partly also because in some cases the Greek terms cover the concept in question slightly better than the Latin terms, and sometimes vice versa.

2 Core Concepts of Rhetoric

What is Rhetoric about? Classical rhetoric is as a rule associated primarily with giving speeches (in Latin: oratio) whose aim is persuasion (in Latin: persuasio). However, while this is not entirely wrong, it is amputated to the point of being misleading, even

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when only classical rhetoric is considered. There are good historical and cultural reasons why classical rhetoric indeed gave its attention to speeches rather than other media, but even in the classical apparatus there is nothing at all which necessitates a limitation of the field of Rhetoric to speeches, or even to words, spoken or written. Rather, the concepts of Rhetoric have to do with how to present a subject matter with a specific purpose – in general, how to achieve effective or efficient communication. In this connection presentation should also be thought of as more than simply the question of how the exposition is couched in words and other expressive means. The notion of exposition is inherent in the rhetorical notion of presentation – thus the logical and temporal structure of the delivery is part of the presentation, and in fact, part of the relevant subject matter. The great Roman rhetorician Quintilian (ca. 35-100 A.D.) clearly dispels any idea of limiting Rhetoric to a matter of outward style or persuasion only:

> Accordingly as to the material of oratory, some have said that it is speech, an opinion which Gorgias in Plato is represented as holding. If this be understood in such a way that a discourse, composed on any subject, is to be termed a speech, it is not the material, but the work, as the statue is the work of a statuary, for speeches, like statues, are produced by art. But if by this term we understand mere words, words are of no effect without matter. Some have said that the material of oratory is persuasive arguments, which indeed are part of its business and are the produce of art, but require material for their composition (Quintilian, IO, 2,21,1-2).

What Quintilian is saying here (in a perhaps somewhat complicated manner) is in essence that rhetorical work is really not on words, but on a subject matter; however the work consists in giving the subject matter an appropriate expression through words (or any other relevant expressive means). This passage thereby also states another fundamental tenet of Rhetoric, which we have already touched upon: the idea that form and content are inseparable. Any change in form implies a change in content – however small – and any change in content necessitates a change in form. That is why presentation is not merely about expressive means and their delivery, but inevitably also about conceptual structure.

Indeed, we here begin to deal with nothing less than the contours of a rhetorical epistemology, and a rhetorical perspective on conceptual structures, however lacking it still is in detail. So this is probably the place to pause for a few but important precautions. Rhetoric began in ancient Greece about 500 BC. Since then this important tradition of Western thought has been developed further till this very day. This fact makes for both historical depth and great systematic refinement of Rhetoric, but it also introduces a complication – the simple fact that various thinkers and epochs have conceived of Rhetoric differently, have emphasised different aspects and so forth. In particular, there was and is an approach to Rhetoric which sees it mainly as a set of communicative techniques with no or little philosophical import (to which I would

count, for instance, the classical standard work Corbett 1999/1965).[1] Indeed, one of the greatest contributors to Rhetoric, Aristotle (384-322 B.C.), is sometimes understood this way (again, Corbett is an example of this). It is quite clear that a discussion of the arguments for or against this approach as opposed to a more philosophically inclined understanding of Rhetoric is quite beyond this paper. Nevertheless, decency demands that it be made clear here and now that this paper is based on the assumptions of what we could suitably call epistemic rhetoric (following Scott 1967). More precisely, the conception presented here is based on the works of in particular Karl Otto Apel (1963), Robert Scott (1967 and later), Ernesto Grassi (1980), Michael Billig (1996), and – in some ways - most of all Karsten Hvidtfelt Nielsen (1995).[2] However, this reservation does not imply any reservations with respect to what I have to say about the basic meaning of rhetorical terms – such as oratio and persuasio, and a number of other ones to follow – explications which will be readily recognised by all professionals of Rhetoric.[3]

So, we should now be ready for a fuller picture of Rhetoric and its epistemology. Rhetorical work sets out by a kind of question, or theme, or issue, which is perceived as problematic – the Latin term for this is *quaestio*:

> The question in its more general sense is taken to mean everything on which two or more plausible opinions may be advanced (Quintilian: 3,11,1).
> To a rhetorician, all issues present themselves under the aspect of a quaestio or causa ambigiendi, that is a sort of "issue in doubt"... In rhetoric, a case

[1] This is particularly evident in the manner in which Corbett repeatedly stresses that argumentation and human understanding should proceed on the basis of pure logos: 'Ideally, people should be able to conduct a discussion or argument exclusively on the level of reason [i.e. logos]. But the rhetoricians were realistic enough to recognize that people are creatures of passion and of will as well as of intellect. We have to deal with people as they are, not as they should be.' (Corbett: 71-72). Thereby cognitively cogent thought is associated with pure logic, whereas the remaining rhetoric concerns must be banned from philosophical epistemology, although they may still be relevant to how human cognition actually works. But as pointed out by epistemic rhetoricians and not least Robert Scott, rhetoric really calls for a notion of human rationality, wherein full human rationally rests on ethos and pathos as well as logos. Advances in neuroscience such as Antonio Damasio's works (e.g. 2000) seem to provide actual empirical underpinnings of this ancient notion - traceable in Gorgias, Protagoras, Cicero and Quintilian to mention some.

[2] Unfortunately, Hvidtfelt Nielsen is ambiguous in this matter. The ambition underlying his (initially) epistemological reading of rhetoric is the dissolution of epistemology – in essence, a post-modern contention that makes content disappear. But we may disregard these grand ambitions and stick with his otherwise excellent examination of possible epistemological consequences of above all Cicero's rhetoric.

[3] Moreover, these references to modern thinkers hopefully make it clear that this paper's focus on classical rhetoric is not meant primarily as an historical exercise. The fact that for instance New Rhetoric is not discussed is simply due to the fact that the core concepts of classical rhetoric are fully sufficient to demonstrate the points of this paper. Since New Rhetoric is mainly an extension and adaptation of classical rhetoric, a demonstration of the systematic relevance of the latter is a fortiori a demonstration of the relevance former. It may be added, however, that the difference between classical and modernised rhetoric is smaller than often assumed, as shown by e.g. Lunsford and Ede (1994).

> constitutes a question with as many angles and sides as there are competent or imaginative orators to represent them (Nielsen 1995: 61-62)

Rhetorical work is aimed at reaching a presentation and a concomitant understanding of the subject matter. This process is directed by an intention implicit in the quaestio – for instance the intention of presenting a convincing case for the acquittal of a defendant, or the intention of finding out whether violent computer games affect children adversely, and so on. The process initiated by quaestio is divided into five phases, the Partes Rhetorices, or the five canons of Rhetoric:

- *Inventio* – in this phase the subject matter is determined and delimited, that is, a number of potentially relevant elements are selected (and others passed by, i.e. omitted). The selection is governed partly by the intention and partly by relations between the elements selected.
- *Dispositio* – the arrangement of the selected elements, for instance into argumentative sequences or conceptual hierachies.
- *Elocutio* – in this phase the style of presentation is chosen and suitable means of expression selected – words and terms, of course, but all kinds of expressive means may come under this phase (pictures etc.). Thus the presentation is given its final or almost final form.
- *Memoria* – the presentation is gone over and memorised as much as possible (in classical times, the presentation was often learned by heart; even so, the speaker should also be able to improvise).
- *Actio* – the delivery, i.e. the time and place when the presentation meets its audience (hearers, receivers, users).

We thus have in view an entire process, initiated by quaestio and its associated intention and leading to a presentation. But we need to determine a little more closely how to conceive of the subject matter, and how the process operates upon it. It is fair, I hope, to say of this paper, that its subject matter is Rhetoric and Information Architecture – with an affinity to conceptual structures. But it is immediately clear that this description opens up a huge domain of possible topics that could result in very many very different papers. We should therefore say that the subject matter (Latin res) roughly circumscribes a large domain of possibly relevant elements. This goes also for much more narrowly defined matters. For instance, the presentation of a case before court may be seen as concerned with, say, guilt or non-guilt of a person with respect to an alleged crime. Even so, the preparation of the defence may lead the investigator into realms not immediately within the scope of the matter – for instance, statistics, laws of acceleration of cars, developmental psychology etc. etc. – often topics not even thought of at the beginning of investigation. Therefore, we shall say that the process operates on a loosely delimited domain of elements. The elements we call doxa, following Greek tradition. Doxa means facts, loosely speaking, but not the kind of hard facts envisaged in referential semantics (like the building stones of the world in Wittgenstein's Tractatus). Doxa are plausible facts, arguable tenets, and commonly held opinions.

The phase of inventio searches for these facts and selects among them. The selection is governed by the intention, of course, but also by relevance criteria. Relevance criteria partly stem from the elements themselves – for example, how one element relates to another one in a possible conceptual hierarchy. But it is also most

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