

# Argumentation in Artificial Intelligence

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## **Abstract**

Argumentation is a form of reasoning that makes explicit the reasons for the conclusions that are drawn and how conflicts between reasons are resolved. This provides a natural mechanism, for example, to handle inconsistent and uncertain information and to resolve conflicts of opinion between intelligent agents. In consequence, argumentation has become a key topic in the logical study of commonsense reasoning and in the dialogical study of inter-agent communication. In this talk an overview will be given of current research in AI on argumentation, with special attention for the dialogical aspects of argumentation.



# Clarification Requests as Enthymeme Elicitors

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## Abstract

In this paper, we aim to establish a relation between enthymematic arguments and clarification requests. We illustrate our discussion with examples where the clarification following a clarification request, together with the problematic utterance, make up an enthymeme. We also suggest possible analyses of how conversational participants, in order to work out an enthymeme, draw on topoi - notions or inference patterns that constitute a rhetorical resource for an agent engaging in dialogue.

## 1 Introduction

Enthymemes, semi-logical arguments drawing on “common knowledge”, have evoked interest among scholars within different fields: computer science (Hunter, 2009), and philosophy (Burnyeat, 1996) on the one hand, composition and cultural studies on the other (Rosengren, 2008). Despite this, the enthymeme has not been studied to a great extent as a linguistic phenomenon. However, there is at least one study that elucidates enthymemes as conversational phenomena - Jackson and Jacobs (1980).

Jackson and Jacobs, whose work is in the CA tradition, claim that the enthymeme is linked to disagreements and objections raised in conversation, and therefore is best understood in terms of dialogue rather than monologue. We agree with this, but would like to suggest that the role of the enthymeme is more fundamental. Consider Walker’s (1996) example of an interaction between two colleagues on their way to work:

(1)

- i A: Let’s walk along Walnut Street.
- ii A: It’s shorter.

Breitholtz and Villing (2008) suggested that the presence of (1)ii despite its informational redundancy (assuming both dialogue participants know that it is shorter to walk along Walnut Street), could be explained in rhetorical terms. The informational content lies in that it refers to an enthymeme according to which, if suitable topoi are employed, Walnut Street being shorter is a good reason for choosing that way to work.

This indicates that enthymemes may play a role in other contexts than just disagreement, for example contexts where an utterance needs to be elaborated, explained, motivated, or in other ways supported in order for grounding to occur. In many dialogue situations, however, reference to an enthymeme is not given spontaneously - attention is called to the need for more information by the posing of a clarification request.

In this paper we will look at the relation between enthymemes and clarification requests, more specifically how problematic utterances and clarifications can be analysed as enthymemes. We will first give some background information about Aristotle’s notion of enthymeme, then look at a few examples of dialogues where some sort of communication problem is signalled by a clarification request that elicits reference to an enthymeme.

## 2 Enthymemes and topoi

An enthymeme can be described as a rhetorical argument rule similar to an inference rule in logic. In the *Rhetoric* (Kennedy, 2007), Aristotle claims that learned, scientific argumentation differs from argumentation concerning every day matters. In rhetorical discourse, it is inefficient to present chains of logical arguments. Aristotle therefore recommends shortening the arguments, which results in them not being strictly logical. However, Aristotle still emphasises the logoi-based, deductive nature of the enthymeme, and calls it a sort of syllogism (Kennedy, 2007).

Some enthymemes can be made into a logical arguments by adding one or more premises, which may be supplied from an agent's knowledge of culture, situation and co-text (what has been said earlier in the discourse), according to argument schemes known as the *topoi* of the enthymeme. These patterns can be very general assumptions based on physical parameters such as volume (if  $x$  is smaller than  $y$ ,  $x$  can be contained in  $y$ ), or more specific assumptions like *the sky is blue*, *dogs bark*, etc.

### 2.1 Topoi as a resource in dialogue

In his work on *doxology*, a theory of knowledge concerned with what is held to be true rather than what is objectively true, Rosengren (2008) employs rhetorical concepts to describe how common-sense knowledge and reasoning are organised. To know a society, claims Rosengren, is to know its topoi. In a micro-perspective, we could say that an important part of being able to handle a specific dialogue situation is to know relevant topoi. Thus an agent involved in dialogue has at his or her disposal a set of topoi, some of which pertain to the domain, some to the topic discussed and a great number of others that the agent has accumulated through experience. This collection of topoi could be regarded as a rhetorical resource, parallel to the way grammatical and lexical competence may be described as resources available to an agent, as envisaged by Cooper and Ranta (2008), Larsson and Cooper (2009) and Cooper and Larsson (2009).

## 3 Clarification Requests

Jackson and Jacobs (1980) argue that enthymematic arguments result from disagreement in a system built to prefer agreement. This suggests that the enthymemes we use in conversation are often evoked by some kind of objection, as in Jackson and Jacob's example in (2):

(2)

J: Let's get that one.

A: No. I don't like that one. Let's go somewhere else.

J: Shower curtains are all the same.

Jackson and Jacobs convincingly show that the discourse of disagreement is indeed associated with use of enthymemes. It seems to us, however, that enthymemes are not just used in order to work out disagreements. They should be just as important in situations where a conversational participant does not understand what another conversational participant is saying or why and how his/her utterance is relevant. The type of utterance that would be used in this type of situation is a *clarification request*. Ginzburg (2009) defines the posing of clarification requests (CR:s) as the engaging in "discussion of a partially comprehended utterance". According to a corpus study by Purver (2004), a little less than half of CRs have the function of questioning the semantic contribution of a particular constituent within the entire clausal content (Ginzburg, 2009). This function is referred to by Ginzburg as Clausal confirmation. Ginzburg (2009) gives an example of this type of CR, repeated here in (3). The meaning of the reprise fragment is to clarify if the rendezvous should really be in the drama studio, indicating that it is not an obvious place to meet and that the suggestion of meeting there requires an explanation.

(3)

Unknown: Will you meet me in the drama studio?

Caroline: Drama studio?

Unknown: Yes, I've got an audition.

(Ginzburg, 2009), p 146

The function performed by the clarification in (3), seems to us similar to that of “it’s shorter” in (1), namely to validate the proposition made in an earlier utterance in terms of its relevance in the dialogue situation. We would like to argue that the clarification is validating precisely because it gives reference to a specific rhetorical argument, an enthymeme consisting of the utterance that provokes the CR, and the clarification.

### 3.1 Examples of Enthymematic Clarification

In this section we will consider two examples where references to enthymemes are made explicit by CRs. The examples are extracted from the British National Corpus using SCoRE (Purver, 2001). First, let us consider (4), where a child is being questioned about a character in a narrative:

- (4)
- i A: Brave
  - ii B: Brave?
  - iii B: You thought she was brave?
  - iv B: Why was she brave?
  - v A: She went into the woods.

BNC, File D97, Line 518-522

In (4) we have an example of a clausal confirmation CR - (4)ii does not serve to find out why the character was brave in the first place (e. g. because she was born brave) but to elicit a motivation to why A said the character was brave.

A topos that would make sense of the argument would be one concerning danger/courage, for example:

$$(5) \quad \frac{x \text{ does } A}{A \text{ is dangerous}} \\ \therefore x \text{ is brave}$$

Our second example works somewhat differently:

$$(6)$$

- i A: Does the group have an office?
- ii B: No.
- iii C: We’ve got our plastic box!
- iv A: Plastic?
- v C: I know I know everybody will be disappointed but I couldn’t get cardboard ones.

BNC, File F72, Line 283-287

First, the clarification (6)v elicited by the reprise fragment, points to two different arguments. Let us first consider the second half of (6) v, “I couldn’t get cardboard ones”. The argument is that C could not get cardboard boxes, and therefore got plastic boxes. An important point to make here is that there are many possible topoi that could be used to reach a certain conclusion. Also, it is not the case that one particular topos makes sense in every possible argument - even within a limited domain. Instead, the topos should be perceived as a resource from which an agent can choose and combine topoi according to the situation. A set of topoi that could be drawn on to resolve this enthymeme is:

$$(7) \quad \frac{x \text{ is made of } y}{y \text{ is bad}} \\ \therefore x \text{ is bad}$$

$$(8) \quad \frac{x \text{ is made of } y}{y \text{ is good}} \\ \therefore x \text{ is good}$$

$$(9) \quad \frac{x \text{ is better than } y}{\therefore \text{choose } x!}$$

$$(10) \quad \frac{x \text{ is better than } y}{x \text{ is unavailable}} \\ \therefore \text{choose } y!$$

The topoi (8), (9) and (10) can be combined to instantiate the enthymeme

$$(11) \quad \frac{\text{cardboard boxes were unavailable}}{\therefore \text{I got plastic boxes}}$$

The function of the premise “I couldn’t get cardboard ones” is, as in (4) to offer an explana-

tion to, or perhaps more correctly, a justification for, the first, problematic, proposition that plastic boxes had been purchased.

The other enthymeme in (6) is different in that the first half of (6)v, that is elicited by the CR, constitutes the conclusion of the argument rather than a premise, and (6)v does not offer an explanation to (6)iii, but expresses a consequence of (6). The argument could draw on the following topoi:

$$(12) \quad \frac{x \text{ is made of } y}{y \text{ is bad}} \\ \therefore x \text{ is bad}$$

$$(13) \quad \frac{x \text{ is bad}}{\therefore x \text{ makes people disappointed}}$$

The enthymeme in (6) is an instantiation of the combination of (12) and (13).

$$(14) \quad \frac{a \text{ is made of plastic}}{\therefore a \text{ makes people disappointed}}$$

## 4 Conclusions

We have argued that enthymemes may have a function in enabling the interpretation of dialogue contributions in cases where the relevance, adequacy, or suitability, of an utterance proposition in a particular situation is being questioned, and that clarification requests may have the effect of eliciting explicit reference to enthymemes. To support this, we have used examples drawn from the BNC. In the examples discussed, we looked at how a set of possible topoi make up a resource from which an agent could choose and combine different topoi that could be used to work out the enthymeme.

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