Argumentation schemes in argument-as-process and argument-as-product

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Abstract

Seeing an argument as a static, fixed, product of reasoning has allowed representational models to be developed which can handle and manipulate complex argument structures. Implementing these models using artificial intelligence techniques has shown how these static structures can not only be the result of argument processes, but can also be the foundation for argument processes. An argument-as-product representation can be used as a basis for providing structured information, for eliciting knowledge from experts, and for mediating online discussion, but in each case must be combined with elements of an argument-as-process representation. One example of a particularly close tie between the product- and process-oriented representations lies in argumentation schemes. It has been demonstrated both that such schemes have a crucial role to play in understanding everyday discourse, and also that they are well within the capabilities of current AI technology. However, the ways in which argumentation schemes drive a dialogue onwards, through a combination of critical questioning and relevance maintenance, has remained largely unaddressed. Here, the relationship between the argument-as-process and argument-as-product representations is explored, using as a focus the roles that argumentation schemes play in the two approaches.

Introduction

For some time, the distinction between the (predominantly verbal) process of argument, and the (predominantly textual) product of argument has been a useful one. Habermas's (1984) argumentation and argument, and O'Keefe's (1977) argument1 and argument2, amongst others, have helped to define and characterise the domain of study for many scholars. Johnson (2000: 291), for example, describes the purview of informal and dialogue logic: "it is possible to see dialogue logic as having its focus on the process of arguing, whereas informal logic is focused on the product".

Few would want to argue that the two aspects are completely divorced. Yet there is little work on the rich

interplay between argument-as-process and argument-as-product. Here, we aim to investigate one aspect of this interplay, by examining the role that argumentation schemes play at the interface between process- and product-oriented views.

Argumentation Schemes and Argument as Process

Normally in informal logic, the aim is to identify, analyze or evaluate an argument found in a text of written discourse. The argument is seen as a product. It is already there, and the analyst going only by what is given there. What is given is a set of statements, one a conclusion and the others playing the role of premises offering support for (or against the view represented by) that conclusion. But even this task quickly becomes one of argument as process. First, to identify the argument, and to classify it as an argument, as opposed to some other speech act like an explanation, one has to identify the conclusion as a specific proposition that doubt is being expressed about, or at least that is open to doubt. This determination presupposes a dialectical viewpoint in which there are two sides to the argument. The proponent has the task of putting forward reasons to support the conclusion while the respondent has the task of expressing doubt about the truth or acceptability of the conclusion. Thus even at this early stage of identifying an argument, the view of argumentation as process is being implicitly appealed to.

A next task is that of filling in unstated premises or conclusions in enthymemes. This task needs to be seen from a viewpoint of argument as process, at least to some degree in many cases. The reason is that, in many cases, to properly cite the unstated component, the critic needs to have some idea of where the argument is presumably going. Suppose, for example, that Bob and Helen are having a critical discussion on tipping, and that Helen is against tipping. She thinks that tipping is a bad practice that ought to be discontinued. She was very upset when she reported that a waiter had spilled soup on her husband's new suit one time when he forgot to tip the coat check person. Suppose that is this context, Helen puts forward the following argument.

Dr. Phil says that tipping lowers self-esteem.

How, as critical argumentation analysts should we reconstruct Helen's argument?

First, Dr. Phil is an expert psychologist, so the argument is, at least implicitly, an appeal to expert opinion. It is also, evidently, an instance of argument from consequences. Helen is telling her opponent, Bob, that lowering self-esteem is a bad consequence of an action. Her argument is based on the assumption that since this bad outcome is a consequence of tipping, tipping itself is a bad thing. Thus Helen's argument is an enthymeme. It is a chain of argumentation based on two argumentation schemes that are links in the chain. The chain of

argumentation can be reconstructed as follows.

The Self-esteem Argument

Dr. Phil says that tipping lowers self-esteem.

Dr. Phil is an expert in psychology, a field that has knowledge about self-esteem.

Tipping lowers self-esteem.

Lowering self- esteem is a bad thing.

Anything that leads to bad consequences is itself bad as a practice.

Tipping is a bad practice.

But how do we know all this? How can we fill in the unstated premises and link them together with other premises and conclusions in a chain of argumentation that represents Helen's line of argument?

One tool we need to use is the argumentation scheme. Appeal to expert opinion can be represented by the following argumentation scheme (Walton, 1997, p. 210).

Major Premise: Source *E* is an expert in subject domain *S* containing proposition *A*.

Minor Premise: *E* asserts that proposition *A* (in domain *S*) is true (false).

Conclusion: *A* may plausibly be taken to be true (false).

The scheme lets us reconstruct Helen's argumentation by filling in the implicit premises needed to make her argument fits the requirements of the appeal to expert opinion. To fill in the other missing parts of the argument we can use the scheme for argument from consequences. There can be argument from positive consequences, but applicable here is the argumentation scheme for the argument from negative consequences (Walton, 1996, p. 76). This scheme represent a defeasible form of argumentation that is used to shift a burden of proof to one side or the other of a dialogue on a balance of considerations.

Major Premise: If an argument leads to bad consequences, all else being equal, it should not be brought about.

Minor Premise: If action *A* is brought about, bad consequences will occur.

Conclusion: Therefore *A* should not be brought about.

This argumentation scheme can be used to give a reason to support the claim that an action should not be carried out. The reason offered is that bad consequences will occur. In this case, it has been shown how both schemes can be used to help insert missing parts of an argument needed to reconstruct the argumentation in the case as chaining forward.

Another tool that is extremely helpful is the context of dialogue that give us some idea where Helen's argument is going, or is supposed to be going, at any rate. We know that in the critical discussion, Helen's view is her negative attitude towards tipping as a practice. She is against it. Thus we know what her bottom line, or ultimate probandum as it would be called in law, is or should be, in the discussion as a whole. Her burden of proof in the discussion is to prove that the proposition 'tipping is a bad practice (that ought to be discontinued)' is true, or at least is acceptable, based on good reasons. Knowing her ultimate probandum in the discussion on tipping, we know where she is going when she puts forward the self-esteem argument. Because of our knowledge of where the dialogue is going, or is supposed to be going, we can see what Helen's aiming point is when she uses the self-esteem argument. We know its ultimate end point, and so we can easily and plausibly fill in the implicit premises and conclusions that would carry to forward as a chain of argumentation leading to that end point. This is why it is so often helpful students and instructors in logic classes when doing exercises on enthymemes to have some indication given of where the text of discourse came from, like a magazine article or a book, and some indication of the issue discussed in the article or book that the argument is generally about.

Thus we can see here that even the most mundane example of treating argument as product, of the kind typical of teaching informal logic and argument analysis, rapidly brings in considerations of argument as process. It looks like what one is doing is only treating the argument as a finished product that exists there is the given text. But the process of deconstruction of even the simplest cases immediately and very heavily leads into considerations of argument as process. One cannot proceed very far without viewing the argument as part of a dialogue in which both participants have roles and functions as arguers. In this case, the proponent needs to be seen as having a proposition that is the ultimate aiming point of her argumentation in the dialogue.

Process, Product and Artificial Intelligence

There is continuing work in artificial intelligence that is focused on building software for the analysis of argument. The Araucaria system (Reed and Rowe, 2001; Reed and Walton, 2002) has been used to mark up

(real) and diagram textual arguments, supporting a (human) analyst's work in reconstruction and identification. One of Araucaria's key features is its support for argumentation schemes. Araucaria is currently being used in the construction of an online repository of arguments drawn from newspaper editorials, parliamentary reports and judicial summaries from around the world.

The result of any given analysis is a marked up version of the original text. That is, the text is interspersed with tags that indicate which parts of the text correspond to individual propositions, how those propositions relate to others (such as standing in premise-conclusion relationships), where particular argumentation schemes are instantiated, where enthymematic premises should be inserted, how a particular claim is evaluated by the analyst, and so on. The format of this markup is described by the Argument Markup Language, AML, described in detail in (Reed and Rowe, 2001). It should be clear even from this very brief summary, that AML is designed exclusively to handle argument-as-product. The Araucaria tool that creates files marked up according to AML is very much a tool of informal logic. As such, it can be employed as an aid to analysis and as a diagrammatic presentation tool in examples such as that of the previous section:

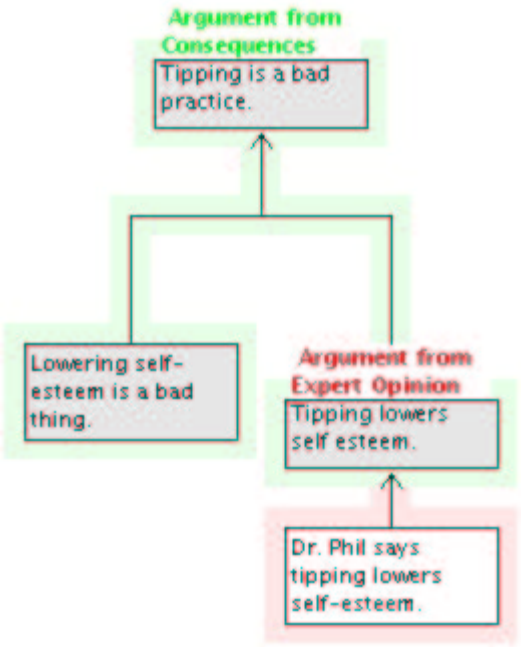

Figure 1. Diagramming the Self-esteem Argument

In Figure 1, schemes are marked as colored areas around parts of the argument combined with a label at the scheme's conclusion, and enthymematic (i.e. reconstructed) claims are shown shaded.

Araucaria does support one feature that appears at first blush to be dialectical, the identification of interlocutors with propositions - termed 'Owners' in Araucaria. The motivation behind this aspect is in being able to handle explicit activity at the dialectical tier, that is, explicit reference to dialectical standpoints. The following offers an example:

> The Semesterisation Argument
>
> Vice Chancellor Brown has claimed that semesterisation would lead to a reduced workload for staff, more flexibility for students, and simpler administration for the university. It seems to me, however, that semesterisation is going to involve an enormous amount of work and should be avoided at all costs.

This includes an explicit contrast between the speaker and an opponent, Vice Chancellor Brown. The very fact

that this contrast is expressed indicates a dialectical component. And yet, this is nonetheless a simple monologue which should yield to an analysis based purely on the product. It should at least yield as easily as any other simple monologue. It is for this reason that Araucaria uses the concept of Owners, which are included in the diagram in abbreviated form:

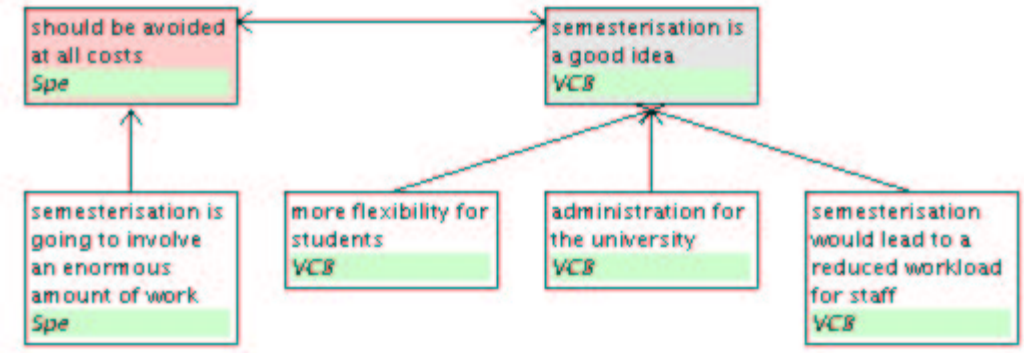

Figure 2. Diagramming the Semesterisation argument

(In Araucaria diagrams, horizontal arrows indicate refutation relationships). Here, the abbreviations VCB and Spe stand for Vice Chancellor Brown and the Speaker, respectively. In this way, a speaker's attribution of claims to other parties can be handled easily.

Of course, although this admits a small dialectical component to the material that can be handled, that material is still very much monological. The claims attributed to others are attributed thereto by the speaker (leaving the field wide open for misrepresentation and straw-man arguments). Only those counter claims that the speaker wishes to mention are included. The presentation (structurally, lexically, orthographically, even phonetically) of the others' claims is entirely controlled by the speaker.

The sort of activity that can be captured by this approach corresponds well to a subset of what Johnson describes as the dialectical tier. The expressing and handling of objections, though implicitly dialectical, is nevertheless part of a good monologue, an argument-as-product. Araucaria could thus be said to support the analyst in unpicking the components of an arguer's monologue that are functioning at the dialectical tier.

With an approach to argument-as-product implemented, it becomes possible to extend the remit of the research not only to argument-as-process, but, most interestingly, to the relationship between them.

The motivations for this work are many and diverse. Consider, for example, an automated, computer-driven

dialogue partner - albeit a simple one - that discusses some scientific topic currently in the public eye with a scientific proponent. The record of that dialogue is stored. Then, run the same dialogue software, this time with an impassioned opponent from a popular non-governmental organisation. The two structures that result include both process and product information that might be combined to allow an online user to chair a meeting with the (virtual) scientific proponent, and her (virtual) NGO opponent, in which the user can solicit contributions from either party, or add their own, or allow the two sides to argue.

Or another example: a computer-conducted dialogue with a teacher on their own topic might elicit chains of reasoning offering explanations that deal with common problems. A student could interact with that stored knowledge through simply defined dialogues.

Or a third: a speech-writer is trying to produce a detailed coherent argument for subsequent presentation as a monologue. She uses a computer to act as a dummy sparring partner: the machine fulfils part of the role of those implicit opponents suggested by the dialectical tier (Johnson, 2000).

There are several steps that will support such developments. First, is the development of a way of representing a dialogue. In monologic argument, it is important to represent the claims and their interrelations. In dialogue, it is necessary to represent not only these claims, but also the dynamic flow of the exchange, including structural links between locutions (such as query-response) and dialogic obligations (such as the defense of a challenged commitment). These have been modelled in dialogue logics and dialectical systems, but the challenge remains of devising a general computational method for handling such systems.

Second, it is then necessary to use this means of representing dialogue to build specifications corresponding to types of dialogue, such as those of Mackenzie (1990), Hamblin (1970), Walton and Krabbe (1995) and so on.

Finally, it is necessary to design and implement the software for conducting dialogues according to the specifications of particular systems, recording the content of those dialogues, and, potentially, employing earlier monologic and dialogic structures during dialogue.

These aspects of implementation are at various stages of development, with a prototype for playing a dialogue game similar to Walton and Krabbe's Permissive Persuasive Dialogue currently implemented. But in parallel to the implementation, runs work examining the theoretical relationships between the process and product oriented views. Here too, the programme of work is getting going.

The first step is to examine one point of contact between argument-as-product and arguments-as-process: the

dual role played by argumentation schemes. On the one hand, schemes represent a mechanism for aiding the informal logic process of analysis and reconstruction, and, more broadly, of critical thinking in general. By identifying claims and trying to link them with schemes, the analyst is guided towards critical questions by which to judge the strength of the claims, their relation, and the resulting argument. Furthermore, the scheme highlights the type of reasoning being employed, refining the single 'support' relationship into a hierarchical taxonomy of specific forms of support. AML stores these additional analytical components explicitly with the structure of the argument.

On the other hand, though, argumentation schemes play a distinctly dialogical role. Consider a dialogue involving two interlocutors, B and W. If B faces a challenge from W over one of her commitments, the set of argumentation schemes either partially or completely proscribes the ways in which B might defend that commitment. The set of possible instantiations of each scheme in which the claim to be defended features as the conclusion is a subset of (or, depending on how the dialogue game is defined, is equivalent to) the defensive moves that B might employ. Given such a defense, the ways in which W might counter B's defense are then given (again, either partially or completely, depending on the game) by the specification of the critical questions associated with the given scheme.

Thus the self-esteem argument can be approached from an informal logic, argument-as-product perspective, with analysis along the lines sketched in Figure 1. The argumentation scheme is playing a structural role. But at the same time, the reconstruction and analysis can also approach the example from an argument-as-process perspective, in two distinct ways. First, the process of argument leaves a trail of artefacts in the argument product. The example of the self-esteem argument is perhaps a little small to see very much of this trail, since so little is left explicit - though it is the dialogical aspect that has led to such brevity. The reason, for example, that the premise 'Tipping lowers self esteem' is left implicit is because Helen assumes that the form and content of her premise 'Dr. Phil says that tipping lowers self esteem' is such that Bob will be able to identify her use of the scheme of appeal to expert opinion, and thereby infer the conclusion. Thus Helen is reasoning about what Bob will make of her argument, and using that reasoning to produce a highly contracted argument. There is thus the original dialogical process between the protagonists Bob and Helen, that leaves structural components that a process-oriented analysis can uncover. But there is also the second process, that of the analysis itself, akin to a dialogue between the analyst and the material. This process can avail itself of many of the same techniques as the original. So for example, the analyst can evaluate the strength of the argument by posing the critical questions. Are the presumptions met in this case? Is Dr. Phil an expert in the right domain (or, more specifically, is it reasonable to think that Bob and Helen thought that Dr. Phil is as expert in the right domain?), and so on.

Thus we have shown that at least one point of contact between process-oriented and product-oriented views of argument - that provided by argumentation schemes - can be represented and implemented in a computational model that handles both the process and product components of argumentation. By uniting the representational adequacy in this way, it is possible to build computer systems that exploit both monological and dialogical structures in building computer systems that have roles to play not only in the teaching of critical thinking, but potentially also much more widely in public understanding of science, electronic democracy and participation, and structured information provision and collaborative working in general.

Current work, however, is focusing on extremely simple systems of dialogue, that would admit horribly poor dialogues between human and machine. To thoroughly exploit the potential areas of application, it will become necessary to increase the sophistication of the dialogue models, and in particular, to equip them with at least rudimentary systems for handling relevance. Argumentation schemes have a role to play in this task as well.

Relevance Determination and Argument Chaining

The notion of argument as process that is implicit in enthymeme analysis becomes highly explicit in making determinations of relevance of argumentation. Relevance is a dialectical notion based on argumentation chaining aimed at an end point in a dialogue. To get some idea why, consider a standard example of the fallacy of *ignoratio elenchi* taken from (Copi, 1982, p. 110).

In a law court, in attempting to prove that the accused is guilty of murder, the prosecution may argue at length that murder is a horrible crime. He may even succeed in proving that conclusion. But when he infers from his remarks about the horribleness of murder that the defendant is guilty of it, he is committing the fallacy of *ignoratio elenchi.*

This example fits Aristotle's nice definition of the *ignoratio elenchi* fallacy given in the *Topics.* Aristotle wrote (*Topica* 162a13 - 162a16) that an argument commits the fallacy of *ignoratio elenchi* (ignorance of refutation) when it proves something other than the conclusion it is supposed to lead to. Here is a literal translation of his remark.[1]

When the argument stated is a demonstration [*apodeixis*] of something, if it's something other than that leading to the conclusion, it will not be a syllogism about that thing.

1 Professor Craig Cooper of the Dept. of Classics at the University of Winnipeg made this literal translation for Doug Walton in December, 1995.

This remark offers a concise explanation of how irrelevance in argumentation should be seen as a dialectical failure. It tells us that argumentation in a given case is supposed to lead to a designated proposition as ultimate conclusion. If an argument is "something other than leading to the conclusion", it is irrelevant. To cite Copi's case as an example, the prosecution in a criminal trial has the burden of proving that the defendant is guilty of the charge. In the case cited, the charge is murder. Arguing at length that murder is horrible crime could be relevant. But in a typical case of a kind we are all familiar with, this line of argumentation could be no more than a rhetorical tactic designed to prejudice the jury. The tactic is one of evoking powerfully suggestive emotions. Such an argument could be something other than leading to the conclusion to be proved. The judge should find it irrelevant. Of course, each case is individual, and much depends on where a line of argument is going, and what has already been said, in any given case.

The analysis of relevance in argumentation put forward in (Walton, 1999) is dialectical. It assumes that in the case of any argument to be evaluated for relevance, the argument is part of a dialogue. The proponent has a thesis, and has a pro attitude toward that thesis. The respondent has expressed doubt about the truth or acceptability of the proponent's thesis. The proponent's thesis to be argued for provides an aiming point and a direction for the chaining forward of her argumentation. If it appears that her argumentation is moving in a different direction, the logical failure that may be diagnosed is that of dialectical irrelevance. On the Aristotelian definition above, the fault is a failure to prove the conclusion that is supposed to be proved, in the discussion the participants are supposed to be engaged in.

The method used to determine dialectical relevance of kind described above is called *argument extrapolation* in (Walton, 1999). The method works by trying to match the given argumentation in the case to an ideal model. In this ideal model, there is a dialogue, and the proponent of the argument has a conclusion (ultimate thesis) to be proved. But does it do that or not? How successful is it in doing that? Does it have any potential for success, or is it merely irrelevant? Does it aim somewhere other than the conclusion to be proved? To answer these questions about relevance, the given argument has to be extrapolated forward to get an indication of where it is leading. It is argued in (Walton, 1999) that this process of argument extrapolation by trying to chain an argument forward to judge where it is leading is the basis of how to determine relevance in a given case. But what tools do we have in informal logic that could help with a determination?

One of the best tools is argument diagramming. This technique is based on the notion of argument as product, as used currently. But could it have other uses as well? Could it be used as a base line for testing argument extrapolation hypotheses by providing the data in a case, assembling that data in a structured diagram, and then using the diagram as tool for forward extrapolation? The suggestion is plausible, because given a well worked out diagram for any given case, one can examine lines of argumentation shown on the diagram, and then extrapolate forward to see if any of them part of a longer chaining forward that aims at the ultimate conclusion that is supposed to be proved by the argumentation in the case. Of course, in many cases, of the kind used as

examples of *ignoratio elenchi* in logic textbooks, very little context is given. Thus there is not enough data available to have a much of a firm evidential basis for judging where the chain of argumentation is leading. Like the case from Copi above, one can only make a conditional evaluation, based on where the argumentation seems to be leading, and where it does not seem to be leading, as far as we know. Working out real cases, of the kind found in legal judgments of relevance in evidence law, or political cases of irrelevance in filibusters and comparable tactics, would be a lengthy task (Walton, 2002). We cannot do that here. Still, the dialectical analysis of relevance indicates how the various fallacies of irrelevance so important in informal logic, require adopting and working with the notion of argument as process. In cases of relevance determination, we start with an actual case, and thus it seems we are working within the notion of argument as product. And partly, we are, because the given data of the case is vital evidence in any relevance judgment. But even the most humdrum cases of working with criticisms that involve an alleged failure of relevance soon show that seeing the argumentation as a process, with chaining and an assumed end point of the chaining, is absolutely required.

This may be to state the obvious, but it could be useful to go back to the example we started out with in this paper, and show how argumentation schemes are helpful in making judgments of relevance and irrelevance. Suppose that in this case, instead of saying that tipping lowers self-esteem, Dr. Phil had said that anger arises from a false sense of urgency stemming from perceived self-importance. In this case now let's ask the same question we asked in the previous one. How can we tell whether what Dr. Phil said is relevant or not in the dialogue on tipping? To answer this question we perform the same test that we did in the previous case. We fill in the unstated premises and link them together with other premises and conclusions in a chain of argumentation that might represent Helen's line of argument. Helen’s ultimate conclusion, as in the previous case, is the statement that tipping is a bad practice.

So how do we get from Dr. Phil's statement that anger arises from a false sense of urgency stemming from perceived self-importance, as premise, to the conclusion that tipping is a bad practice? There doesn't seem to be any obvious way to do it. But let’s try. It may be that Helen is arguing that tipping somehow stems from the perceived self-importance of the angry tipper, which in turn stems from his false sense of urgency. Perhaps she is trying to argue somehow that because tipping arises from these unworthy motives of failed anger control it is a bad practice. But there is no evidence of such a connection in her argumentation. Nor is it very plausible that somehow we could get from Dr. Phil's statement about anger arising from perceived self-importance to the statement that tipping is a bad practice. There may be some way to fill in unstated premises and link them together with other premises and conclusions to fill in this gap, but it is far from obvious how it should be done. There are no plausible unstated premises that are easy to find of a kind that could plug in the gaps between Dr. Phil's statement about anger stemming from perceived self-importance and the ultimate conclusion that tipping is a bad practice.

What to conclude from this is the Dr. Phil's statement that a false sense of urgency stems from self-

importance is not relevant in the dialogue on tipping, at least as far as we know, given the details of the case that we know so far. By default, the judgment is made the Dr. Phil's pronouncement in this case is not relevant. This judgment can be contrasted with the judgment arrived at in the previous case where Dr. Phil said that tipping lowers self-esteem. This statement was found to be relevant by linking it up through argumentation schemes and unstated premises in a chain of argumentation that led to two Helen's conclusion in the dialogue.

Conclusion

In arguing for a focus on written argument, Johnson makes the following observation:

"... the process [of arguing] may extend over a long period of time, as, for example, philosophical arguments tend to do. Even today, philosophers are engaged in the process of arguing with Plato, who has been dead for over 2,000 years." (Johnson, 2000: 156)

Johnson may not want to be pushed too far on the question of whether or not this is a real argument1 in the O'Keefe sense, or a real argumentation in a Habermas/pragma-dialectical sense, but the thought provides inspiration for a final example.

Let us assume that the arguments of Plato have been marked up in an appropriate way, to highlight their internal structure. Though a daunting task, this work has in fact begun (and substantial progress been made) under the auspices of Scaltsas's *Archelogos* project at Edinburgh (Scaltsas, 1998). This material might be used directly, or might be recast in Araucaria-type structures, or some other representation - but whichever form is employed must include information about the types of reasoning employed at different steps. That is, the representation much specify (something akin to) argumentation schemes. Imagine, then, that we have at our disposal an enormous body of closely analysed argument-as-product. As *Archelogos* and related projects have demonstrated, such material can be used as an aid to the teaching of philosophy. But these pedagogic applications focus on exploration of the static structures that are the original texts.

Using the experiences and results of *Archelogos* as a foundation, it is possible to see a richer mode of interaction. By defining a particular dialectical system enriched with argumentation schemes (say, one that emulates Socratic questioning) and provides thereby for dialectical relevance, and then providing that system with the marked up source material as substrate, a student could not only interrogate the system for information, but could enter a dialogue that emulates a (Socratic questioning) dialogue with the original author.

We have presented here the first steps in a research programme examining how argumentation schemes can be used to build models of argumentation that can be implemented in artificial intelligence. In studying the topic from both theoretical and applied sides, it has become clear that the process-product distinction is an oversimplification of a rich set of relationships between the protagonists and the analyst.

Acknowledgements

All the figures in this paper have been produced using Araucaria. The authors gratefully acknowledge the continued contributions of Glenn Rowe to the development of the Araucaria system. Araucaria is available for download from
`http://www.computing.dundee.ac.uk/staff/creed/araucaria`
Access to the online corpus of analysed arguments is available at the same web site.

Doug Walton gratefully acknowledges the support provided to him by the Social Sciences and Humanities Research Council of Canada under the project *Argumentation Schemes in Natural and Artificial Communication,* and Chris Reed gratefully acknowledges the support provided by the Leverhulme Trust for a project of the same name.

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