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Rules, Defaults, and the Meta-level of Informal Logic

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1.0 Introduction

When studying "arguments" or teaching courses about them -- in contrast to providing an argument -- we are operating at the meta-level. The meta-level/object-level distinction is familiar from formal logic where it is frequently stressed when initially laying out the object language or proving that a theory constructed in the object language has various properties, e.g., consistency or completeness. However, instructions about how to carry out the tasks of informal logic are also at the meta-level. What is the nature of these instructions?

Textbooks (whether in formal or informal logic) contain similarities. All introduce concepts and contain specifications of the criteria to be met if a concept is applicable, specify procedures to be followed to obtain the desired results, rules to be followed, check lists, guidelines, rules of thumb, etc. (with the caution that there will be exceptions), and various kinds of instances including examples, illustrations, and problems on which the student is invited to test their understanding.

What I want to do in this paper is survey a number of sets of instructions utilized in informal logic, especially those concerned with argument recognition and reconstruction. After accomplishing this survey, the issues that an account of these instructions face will be rehearsed, and then the paper will turn to a look at several analyses that have been provided, consider some possible alternative analyses, and finally briefly point out some of the considerations that follow from the discussion. Informal logic is a multi-faceted enterprise with tasks other than those mentioned above so numerous aspects will not be considered, but this subset of the tasks is rich enough to provide numerous issues for consideration.

2.0 Instances of Instructions – Round I

My first example of instructions is the set of general strategies for standardizing arguments provided by Trudy Govier (Govier 2001, pp 38-39).

1. Read the passage carefully several times, making sure you understand it.
2. Confirm that the passage you are dealing with actually contains an argument. It contains an argument if, and only if, the author is trying to support a position with claims offered in its defense.
3. Identify the main conclusion or conclusions and any sub-argument structures. Indicator words

should help. Often the context is helpful, particularly when one person argues against another. Typically in that case, one person's conclusion will be the denial of the other person's position; and the person denying another's position will offer reasons for doing so.
4. Identify those statements in the passage that are put forward as support for the main conclusion and any sub-conclusions. It is helpful at this stage to look at the statements in the passage and ask yourself which ones could plausibly give support, or be thought of as giving support, to the conclusion you have identified.
5. Omit any material that serves purely as background information, for example, introductory or editorial remarks,
6. Omit material that you have already included. This instruction applies when the same premise or conclusion is stated several times in slightly different words, except in two circumstances. First, if this happens when the different wording indicates first a premise and then a conclusion in the same argument do put the statement twice in your standardized version. (As we will see later, this situation means there is a serious flaw in the argument.) Second, you may wish to do this if a statement is first the conclusion in a sub-argument, and then serves as a premise in the main argument. In other circumstances, don't repeat the statement.
7. Omit such personal phrases as "I have long thought," "in my humble opinion," and so on. These are not part of the content of the argument but are stylistic indicators of the author's direction.
8. Number each premise and conclusion, and write the argument in the standard form with the premises above the conclusion.
9. Check that each premise and conclusion is a self-contained complete statement. This means that premises and conclusions should not include pronouns such as he, my, it, and this. Instead, the appropriate nouns should be used. Also, premises and conclusions should be in the form of statements, not questions, commands, or exclamations.
10. Check that no premise or conclusion itself expresses a whole argument. For instance, if one premise says, "John has lied before so he is unreliable," you need to break this premise further into (1) John has lied before and (2) John is unreliable. In the structure (1) will be shown as supporting (2) in a sub-argument. The sub-argument will not be shown if you write "John has lied before so he is unreliable" as a single premise.
11. Check your standardized version against the original to see whether you have left out anything essential, or included anything that, on reflection, you think should not be included.

3.0 A Brief Analytical Segue

Note that these individual statements have imperative characteristics starting with action verbs such as "identify", "check", "omit". The injunctions to take action generally do not include criteria to know when the action has been satisfactorily carried out. (This is not making the claim that criteria are not provided elsewhere.) Govier's label for this set of statements is general strategies. Despite this name, collectively they appear to be more of a "block" flow chart of the major tasks in identifying and reconstructing an argument found in ordinary discourse.

Each of these strategies, in turn, requires a whole other set of instructions about how to carry out the particular task named. This in turn will involve yet additional tasks. A complete analysis would require a detailed examination of the sub-tasks required by each of these injunctions. Because of the constraints of this paper we will examine only one. The third "strategy" listed above involves identifying the components of an argument. Instructions for carrying out the sub-tasks involved in this include providing lists of words to help determine that a passage contains an argument and which statements are playing which role. It is to an examination of these additional instructions I now turn.

4.0 Instances of Instructions – Round II

The following two lists of "inference structural words or phrases" are useful in sorting out premises and conclusion in ordinary discourse (Thomas 1986, pp.12-13).

Partial list of words or phrases that often function as inference indicators PRECEDING PREMISES

as...(many exceptions)	seeing that...
since...(many exceptions)	for the reasons that...
for...(many exceptions)	in view of the fact that...
because...	on the correct supposition
as shown by...	that...
as indicated by...	assuming, as we may, that...
follows from...	may be inferred from...
being that...	may be deduced from...
being as...	may be derived from...
inasmuch as...	whereas...(in legal documents)
in the first place...	in the second place...
firstly...	secondly...

Partial list of words or phrases that often function as inference indicators PRECEDING CONCLUSIONS

consequently…	points to the conclusion …
therefore…	that…

which shows that…	allows us to infer that….
proves that…	suggests very strongly that…
hence…	leads me to believe that…
so…	bears out the point that…
you see that…	thus…(frequent expectations)
implies that…	demonstrates that…
entails that…	it follows that…
accordingly…	in this way one sees that…
I conclude that…	then…(without preceding 'if'; has expectations)

Standard warnings about the complications that may be faced when using indicator words include: (i) not all arguments contain indicator words; (ii) some indicator words have functions other than as indicator words; (iii) sometimes indicator words indicate forms of reasoning other arguments, e.g., explanations; (iv) conclusions are sometimes missing from arguments; (v) some discourses are borderline with respect to whether they contain an argument; and (vi) no listing of indicator words will be complete.

As an instance of an argument without indicator words consider: "It is going to snow. You should make sure that the snowblower has gasoline."

Some indicator words such as "for" and "since", are ambiguous, having grammatical roles in addition to their role as reasoning indicators. Consider these statements:

> He did the job *for* ten dollars an hour.
> The earth is at least 4 billion years old, *for* some of its rocks have been shown to be this old.
> She has been gone *since* the Fourth of July.
> *Since* today is her birthday, we can expect cake and ice cream.

The italicized terms in the second and fourth statements are reasoning indicators, but in the first and third statements, they play a different role. A reasoning indicator is usually followed by a sentence or a clause. In contrast, when these sentences are playing a different grammatical role, they are often followed by a phrase that is not a sentence or a clause as in the first and third statements (Lee 2002, pg. 41).

The presence of an expression from the reasoning indicator list is not an infallible indication of an argument. These expressions are often reasoning indicators rather than specific indicators of an argument. Two such alternative forms of reasoning are explanations and predictions. Since all are forms of reasoning, something other than a reasoning indicator must be utilized to distinguish among them. Temporal sequence and purpose are often suggested as means to distinguish between an explanation and an argument. If the conclusion of the reasoning is an accepted fact, then the reasoning is an explanation. However, if the premises are put forward as grounds to justify a conclusion as true, then we are dealing with an argument. Arguments offer justifications; explanations offer understanding.

Some texts use other indicators besides direct inference indicator words listed previously. General indicators can be whether the passage deals with investigation and controversy. Word indicators of this include: "evidence", "clue", "discover", and "investigators." Many general indicators are contained in proposals and recommendations around which controversy swirls. These often contain normative terms such as "should", "ought", "right", and "wrong." Indirectness flags --major ones are "must", "may", "probably", "likely", "apparently", and "seems"-- indicate not known directly, but inferred from something else and thus indicate arguments. Pairs of these indicators are particularly powerful -- indirectness coupled with support or implication; indirectness in an investigation; and a proposal or recommendation with support or implication (Wright 2001, pp.108-114).

5.0 For what does a conception of instructions have to account?

5.1 The Phenomena

What are the phenomena that the instructions are attempting to deal with? What we have seen demonstrates that the instructions provided have to deal with situations of considerable complexity. However, we have looked at a limited number of instances. Other complexities are known and have been discussed elsewhere. It is worth summarizing this additional complexity to be faced by pointing out the considerations posed for argument identification by -- context, purpose, theory, underdetermination by evidence, the difference in interpretation made by whether one holds a compositional and a wholistic conception of argument, the nature of the concepts being utilized, and the nature of the reasoning involved, etc (Asquith 2001a, 2002).

There are a variety of ways in which there can be context dependency -- knowledge and intents brought to the situation by the individuals; the situation itself taken holistically; the broader environment in which the situation is located. Background knowledge, judgment, and discretion are relevant to argument interpretation as are social and dialectical contexts. Even one's assessment of the truth of the premises depends on what one knows.

Theory makes a difference. What will be identified as an argument differs according to the view of argument held. If an intended entailment is identified as an argument, then there are clearly valid deductive entailments which will be identified as arguments, e.g., addition, conjunction, or repetition. However, most individuals not schooled in formal logic are generally reluctant to consider these as arguments and they would be rejected by numerous non-entailment theories of argument. It is also the case that evaluation criteria adequate for ensuring that we have a "good" argument also depend on the theory adopted.

There can be underdetermination by evidence, immediate context, and theory. While theory and context play critical roles in determining whether we have an argument and if the argument is "good", the claim being made is not that knowing both theory and context will always make clear how to interpret and evaluate a passage. Knowing all of these things can still leave one in a position where more than one argumentative interpretation of the passage is possible.

Arguments are constituted of various components, e.g., claims, structures, etc. What are the relationships between these various components? There are several approaches a theory of argument might take -- a compositional/component approach or a more contextual/holistic approach. On the compositional approach each component is regarded as capable of relatively independent treatment while on the other components need to be treated in relationship to one another as well as the overall context in which they occur. On the first view, reading with comprehension is the understanding of the basic substantive claims being made in the passage, which occurs independently of argument structure and evaluation. Understanding some of the claims may be context dependent, but is not seriously theory dependent. The second interpretation makes understanding the argumentative structure as well as the evaluation of argument candidates an inherent component of basic comprehension of the passage. Which way should an ambiguous claim be interpreted? On the wholistic approach the argument structure as well as contextual clues is relevant.

The data provided by the passage itself can contribute to the complexity of the situation. All of the cases considered above presuppose that the passage provides consistent information, but there is the possibility of conflicting data in the passage.

The nature of the criteria being used is also a factor. The classical conception is that a criterion specifies a set of features that are singly necessary and jointly sufficient. Although an instance must have all of the defining features, it is not precluded from having additional features. However, the defining ones are the only ones relevant to whether the criterion is met. If all of the defining features are present, classification succeeds; otherwise it fails.

There are numerous discussions in the philosophical literature about the difficulty of providing such a specification for all concepts. Alternative types of criteria which might be encountered include: sufficient conditions only; statistical rules; a list of necessary conditions which allows elimination in the absence of one them, but provides no sufficient conditions; guidelines or indicators with no specification of the circumstances under which they work although often relatively common exceptions are pointed out. Concepts for which instances may be characterized in a variety of ways and for which it is not possible to come up with a definition in terms of necessary and sufficient conditions are sometimes referred to as "polymorphic."

The most basic concept in argument identification is that of "argument." There appears to be no general agreement on the exact definition. But, at least among those dealing with rational argument theory, all include giving reasons in support of a claim as a necessary condition. It is at the next level, determining whether this or that should count as giving a reason, where the situation becomes complex and the appropriate criteria to utilize less clear. My belief is that all theories of argumentation experience similar lack of clarity when the attempt is made to apply the theory to ordinary discourse.

5.2 The Reasoning

In making a determination if the criteria are met one considers reasons for and against. Initial assessments of how strong the reason is will be subject to change. For example, a "since" may initially be taken as a premise indicator. However, once the context makes clear that it is being utilized as a temporal adverb, the initial belief that the "since" indicates a reason both to suppose that there is an inference and that what follows is a candidate for being a premise or the premises is rejected. Assessing whether the criteria are met is both a process and a judgment. Consequently, the assessment can change over time. There are a variety of ways in which initially given reasons either can be eliminated, strengthened, or weakened. Among the situations under which an assessment might change are: (i) realizing that some of the evidence has been overlooked; (ii) altering the emphasis placed on a particular part of the evidence; and (iii) reevaluating the relevancy of portions of the passage to determining whether the criteria are satisfied.

Any interpretation of the instructions for dealing with argument recognition and identification is going to have to be compatible with these aspects of the situation. The reasoning to determine whether or not there is an argument is in many cases, but not all, not going to be definitive. Reasoning often appears to be preponderance of the evidence type reasoning. Consequently, both the possibility of there being evidence not previously taken into account and the possibility of being wrong must be allowed for. In other words, the reasoning is non-monotonic and defeasible. We want reliable conclusions, but do not anticipate having irrevocable ones.

6.0 Instructions as Rules

One of the ways of conceiving of instructions in the meta-language is to imagine that rules – either tacit or explicit – are being provided. For example, in the case of indicator words the rule is tacit and what is really being provided is an "if, then" statement in which the antecedent is a statement of the form "upon finding an instance of this indicator word" and the consequent statement is the form "treat this as an argument or treat the statement following as the premise of an argument." The literature contains several discussions of rules for argument recognition and specification. A very strict interpretation of rules would be as algorithms.

The question as to whether it would be possible to write a general argument recognition and specification computer program has been asked:

> Questions such as these do have answers, but not always uniquely correct ones. Ordinary language is far too complex for us to be able to write a general argument-recognition program. There is no algorithm, or set of precise instructions, by which a person or machine, presented with an arbitrary body of actual discourse, can mechanically pick out in a finite number of steps just those sequences of sentences that are associated with the appropriate claims and thus constitute arguments (Blumberg 1976, 21).

Note that there is a switch in this passage between a general argument recognition program and an algorithm that picks out the correct answer. That switch is something we will want to return to when considering alternative analyses.

There are more liberal construals of "rules" than as algorithms. In the "Poverty of Formalism" Govier has also dealt with this issue of whether there are rules for argument interpretation. She considers four sorts of rules; (i) strict formal rules -- syntactic and hold universally; (ii) strict material rules -- non-syntactic but hold universally; (iii) general rules that hold most of the time, but have a ceteris paribus clause; and (iv) rules of thumb -- rough guideline for action (Govier 1999, pg. 90).

Govier argues, and the previous review of the sorts of instructions provided also shows, that any such rules could not hold with strict universality. For Govier this eliminates the first two types of rules. She also rejects the fourth possibility listed above. Rules of thumb despite being called "rules" are, at best, indicators. They lack the systematicity to be true rules. Rejecting them as rules does not mean they are not useful as their frequent inclusion in informal logic texts attests. The plausible candidate is a rule with a ceteris paribus clause. But then how do we deal with the application of ceteris paribus clauses? The application of such clauses appears to require either an exhaustive listing of the conditions under which the ceteris paribus clauses apply or a set of rules is available to govern their application. The exhaustive listing presupposes knowing all the situations in which the ceteris paribus clauses are applicable, something the inclusion of the clause tacitly acknowledges is not the case. Rules for applying rules raise the specter of infinite regress.

Both of these authors seem to be drawing the conclusion that whatever an important subset of the instructions is, it does not consist of algorithms or rules. There appears to be a richer variety of interpretations of rules that need to be considered than those in this analysis. Besides the possibility of more ways of construing individual rules there appear to be a number of other factors that need to be taken into account. Among the variables that potentially might make a difference are: (i) the nature of the concept being dealt with; (ii) different possible natures of the individual rules; (iii) how the rules fit together to specify the overall procedure or strategy; (iv) what is involved in determining that a rule is applicable; and (v) how it is determined when the process of applying the rules is at an end.

7.0 A second look at the interpretation of instructions as rules

7.1 Alternative Conceptions of a Rule

One possible line of attack is to consider alternative conceptions of individual rules. There are several relatively standard ways in which universal rules are altered when faced with exceptions or instances in which they are not applicable: (i) increase the set of rules and narrow the scope of the individual rules so that the rule in question no longer apples to the offending situation or (ii) make rules probabilistic. The first attempts to retain something close to the conception of rule discussed above, but with more rules each of which has a more restricted scope. An issue to be dealt with on this conception is how to distinguish the situations that warrant a change in the rule from ones that should result in abandonment rather than revision of the rule. The second allows for exceptions, but requires a metric which seems implausible in the situation being considered. A more recent suggestion of a possibility for rules that allow exceptions, but do not require a metric, is default rules.

7.1.1 Defaults

Defaults are, in a sense, a more formal representation of rules of thumb. Utilizing them does result in defeasible reasoning. Consider the common sense notion that birds can fly. This is a useful generalization, but one that clearly has exceptions – dead birds do not fly, ostriches and penguins do not fly, some sick and injured birds do not fly. While there are major categories of exceptions that can be listed, exhaustively listing all of the exceptions is impossible. Nonetheless, holding the generalization that birds fly, while noting known major categories of exception, seems worthwhile as it appears to lead to true conclusions more often than not. It is this notion that defaults are intended to capture (Besnard, pp. 1-4; 31-36; 101-110). Consider the following:

<u>*BIRD* (x): *FLY* (x) and ~*PENGUIN*(x) and ~*OSTRICH*(x)</u>
FLY (x)

which represents a default. It is to be interpreted as "if x is a bird and if it is consistent that x can fly then infer that x can fly." The whole claim is the default. *BIRD*(x) above the line is called the prerequisite of this default -- the basic category of entity we are dealing with. *FLY*(x) and ~*PENGUIN*(x) and ~*OSTRICH*(x) above the line is the justification of the default while the *FLY* (x) below the line is the conclusion of the default. As another example consider:

<u>*SUNDAY*(x): *FISHINGDAY*(x) and *WAKINGDAY*(x)</u>
FISHINGDAY(x)

Default reasoning depends on not having complete information . Conclusions of defaults depend on the absence of information, e.g., if this is a bird it can fly unless there is some other information that is inconsistent with this particular bird being able to fly.

An interesting project would be to attempt to set up defaults for the various indicator words listed previously. This would result in defeasible reasoning, but with a number of items to check before the consequent of the default was accepted. Clearly, a start would be achieved simply by taking the instructions from various texts and attempting to codify it in default form. However, all is not unproblematic with respect to defaults. One of the problems with defaults is that it is fairly simple to generate inconsistencies. For instance consider the following additional default:

<u>*HOLIDAY*(x): ~*FISHINGDAY*(x) and ~*WAKINGDAY*(x)</u>
~*WAKINGDAY*(x)

If we have a day that is both a Sunday and a holiday, then we can infer that that day is both a fishing day by the earlier default and not a waking day by this default. Additional rules need to be in place to provide guidance as to which of the two inconsistent claims is to be given preference. A legitimate question to raise is whether or not this isn't simply a formalization of the previously encountered problem with ceteris paribus clauses.

Moreover, while the goal is having a system of defeasible reasoning that doesn't mean that each of the rules (or any of them for that matter) must themselves be defeasible. How the whole set of rules operate together is another way to support defeasible reasoning. This provides us with other possibilities for consideration.

7.2 Automation and Algorithms

One of the positions discussed earlier considered the possibility of interpreting the instructions as algorithms. However, that discussion relied on an intuitive conception of algorithm. A more systematic consideration of algorithms will facilitate a deeper analysis. An algorithm is an infallible, step-by-step recipe, where all legitimate steps are designated in advance, for obtaining a pre-specified result in a finite number of steps. Each of these characteristics is worth examining individually.

Infallible means the procedure is guaranteed to succeed positively in a finite number of steps. A positive technique is one that can succeed absolutely, totally, and without qualification. A positive technique isn't guaranteed to succeed. The question isn't whether it will succeed, but rather how well it can succeed. A reliable procedure has a high likelihood of success whereas a guaranteed procedure has a hundred percent likelihood of success.

"Step-by-step" means: (i) the procedure prescribes one step at a time, one after another; (ii) it is clear when a step has been completed and what the result of that step is; (iii) after each step, the next step is both determined and obvious. However, this doesn't mean that there can't be branches in the step by step routine. Which branch is to be taken in a particular case being completely determined by the previous steps.

Finite means that the procedure terminates in a determinant number of steps although that number will not necessarily be known in advance. An algorithm is a procedure that always terminates. Algorithms can be either decision procedures or calculation procedures. It is a decision procedure or method if the final answer it provides is either a "yes" or a "no". It is a calculation procedure if the final step is exhibiting some object. Algorithms can be elementary -- utilizing only one of the initially given basic defined steps -- or arbitrarily complicated operations accomplished by performing ordered combinations of elementary operations.

Whenever the legal moves of a formal system are fully determined by algorithms, then that system can be automated. However, the distinction needs to be made between whether a system can be automated and whether the system is such that every determination required by the system is algorithmic.

In a chess program the move-lister component -- what moves can be made given the current configuration of the board -- is algorithmic and theoretically trivial, but the move-chooser component is a different story. Here all sorts of factors need to be considered and it is highly unlikely that there is only a single correct choice. If the criteria to be utilized in selecting a move from among the possible moves are laid out in sufficient detail, the calculation procedure to determine what that move might be is algorithmic, but the process used to choose those criteria is not. In the case of argument determination and reconstruction there is frequently more than one possible answer consistent with the evidence available to us. However, after selecting the criteria to be used to determine an answer, the process of determining the answer that fits those criteria may be algorithmic.

It may appear that a branching algorithm includes choice. What a branching algorithm includes are exhaustive and inclusive options. Simply having followed the preceding steps of the algorithm will definitively determine which of the options applies. When choosing between alternative interpretations of a passage the choice is not definitively determined by previous steps in the process.

Given this analysis Blumberg's earlier claim that there was no algorithm to determine argument structure appears to be correct, but his claim about being able to write a general argument recognition program involves considerations in addition to algorithms – namely what are ways we can choose among the choices?

7.3 Heuristics

How can a system of allowing choices be automated? The real problem is to design a chooser that makes good (reasonable, intelligent, wise….?) choices. Fallible, but fairly reliable procedures are called heuristics. Heuristics are not algorithms because algorithms must be infallible. It may be possible to devise a strict, precise formula for applying and combining various well-defined rules of thumb. The output of this formula is a fallible, but relatively reliable estimate of the best move in a given situation. If the formula itself is perfectly explicit and unambiguous, then it can provide the basis for a routine that infallibly calculates the value. As a routine to calculate the estimate it is an algorithm. If the goal is finding the optimal move, then it is only a heuristic. There are numerous heuristic procedures in widespread use; (i) hill climbing technique – determine a solution and then attempt to achieve a better solution; (ii) greedy random adaptive search procedure; (iii) genetic algorithms; (iv) simulated annealing algorithms; and (v) tabu search algorithms. Beyond heuristics themselves meta-heuristics can guide and modify other heuristics to produce "better" solutions beyond those generated by a single heuristic. A system utilizing heuristics can be automated. What the heuristic is and to what answers it applies needs to be specified.

What are the implications of this for argument identification and reconstruction? It suggests that the appropriate way to conceive of any effort to construct an automated program for argument recognition and reconstruction would involve both algorithms and heuristics. Which would be used where would depend on the question being asked and whether or not a unique answer can be calculated. But clearly there would be at least two different sorts of rules involved – algorithms and heuristics.

8.0 The Hierarchy of Instructions

8.1 Meta-data

Whether a computer program or a human is attempting to analyze a passage to determine whether there are arguments in the passage and, if so, reconstruct those arguments, they are working with data – the passage – and attempting to characterize various components of that data – meta-data. Meta-data are simply data about data. There are numerous common instances of metadata. For example, a library card catalog is a collection of metadata elements. Meta-data are themselves data and can be treated as such. In data management the contrast is sometimes drawn between structured data and unstructured data. The difference appears to be whether there is an explicit theory of meta-data available and the extent to which the various constituents of the data carry explicit meta-data labels.

A passage is a dataset which for the purpose of either formal or informal logic we are, in effect, attempting to make explicit the meta-data. Any given statement can function in a variety of ways. Which of the ways it is functioning in a particular case -- as a premise, a conclusion, an irrelevant claim, as both a premise and a conclusion -- is relevant meta-data from the standpoint of argument analysis. If the meta-data are explicit or nearly so, then the meta-data are readily available to utilize as part of the processing. If the meta-data are not explicit, then one is facing a more difficult proposition. How should one attempt to make the meta-data explicit?

One way of conceiving the giving of instructions is giving procedures for determining what the meta-data is and how to use them in the construction of arguments or symbolizations. To do this answers need to be provided to: (i) what counts as the pertinent meta-data? (ii) are the meta-data explicitly available and, if not, how are they determined? (iii) how is the meta-data utilized to determine the symbolization or reconstruct the argument? There are really two main stages here. First, determining and making explicit the relevant meta-data. Meta-data will include that the element is a statement, what type of statement an element is, the arguments in which an element occurs, and the role in each of the arguments in which the statement occurs. This later is dependent on the theory of argument espoused. Secondly, processing the meta-data to create the larger argumentative structure composed of the initial units. Again this will depend of the theory of argument held.

One way of presenting the metadata information is via a mark up language. HTML -- HyperText Markup Language, used to develop web pages, is an example of a markup language. The markup is expressed by tags. Usually, but not always, there are start tags and end tags appearing in pairs, e.g., <P> and </P>. Attributes extend the capabilities of tags by allowing the tag to have a variety of values. XML – extensible markup language – allows one to determine one's own set of tags within the demands of the syntax of XML. How one is utilizing one's set of tags is described by a DTD – document type definition—that consists of element declarations and attribute declarations. Element declarations allow you to name your elements (tags) and define any children that an element might have. One starts with a root element and then all other elements are nested within the root or a child of the root element. Elements can be defined to have different types of content. HTML is actually a formally defined DTD of SGML – Standardized General Markup Language. In our case what we would want to do is develop a markup language for picking out what is important about a passage as argumentative discourse.

Given the meta-data can the argument structure be calculated? Several programs do a version of this -- Araucaria, Reason!Able, and Athena. To accomplish this Araucaria develops a markup language AML – Argument Markup Language -- that has the most basic element ARG which has possible children of SCHEMESET, TEXT, and AU where AU represents an argument element, TEXT represents the original text , and SCHEMESET stands for an argument scheme. In turn AU has children indicating whether it is a proposition or a refutation and a member of a linked or convergent argument. A SCHEME consists of a name, form and a set of critical questions. These reflect the various arguments schemes proposed by Doug Walton.

Can the meta-data themselves be calculated or at least an approximation to the meta-data be calculated. Clearly this is an immense and difficult undertaking. I am not sure that anyone has actually attempted to do this. Nonetheless, this is what we attempt to accomplish with students in informal logic courses. Texts offer rules of thumb and comment on the exceptions. Can we do more to analyze the instructions we give and make them more explicit?

There is also an additional consideration with regard to meta-data and their manipulation. The algorithms that can be performed depend on the data structure and part of the value of the data structure depends on what algorithms are available to make calculations based on that data structure. There are various ways of conceiving this combination – data structure/inference procedure. In logic programming the data structures mirror the predicate calculus and the algorithm is a type of deductive proof. In rule-based systems knowledge is represented in conditional production rules. Algorithms match the rules against a knowledge base and draw conclusions. Frames or Schemas present another approach to this combination. Which form of representation works best for argument identification, analysis , and reconstruction? The above intended as an illustration, not a claim that this is the only or the best way to accomplish designating and manipulating meta-data.

9.0 Concluding Remarks

This paper does not do justice to the variety of alternative ways in which the instructions might be interpreted as rules. A thoroughgoing analysis would catalog all the different possible interpretations of rules and analyze how they fared against the phenomena they were employed to organize as well as review their theoretical limitations. Nor has it considered other possible interpretations in addition to a rule interpretation. Rule-based reasoning is not the only possibility for attempting to understand how the meta-reasoning in logic proceeds. One of the standard ways of providing instructions is via examples and they have not been analyzed in this paper. Case-based reasoning is another possibility that needs to be examined. (Asquith 2002).

However, I believe that it has shown that more needs to be said about the utilization of rules than the analysis provided by either Blumberg or Govier. There is a sense in which Blumberg's and Govier's conclusions might be taken to be correct, e.g., if one were restricted to only algorithmic processes utilizing universal generalizations with simple antecedents and expecting that there is a single correct answer that the algorithm will generate. However, this analysis of the role of rules and the dismissal of the possibility of automated or formal systems by Blumberg and Govier was based on a limited analysis of the possible conceptions of rules. While the complexity is enormous, there appear to be research programmes to be followed in an attempt to see what is possible.

There are various ways in which the understanding of the instructions we provide can be important. Understanding them is necessary to develop automated aids to utilize in instruction. Repetition and immediate feedback are proven pedagogical techniques. Automated aids could take a variety of formats – human provides the meta-data and machine constructs the argument based on the meta-data provided; machine calculates the meta-data, constructs argument based on the meta-data, and student critiques; student presents several possibilities and machine assesses the relative merits of these alternatives; human presents a possibility and then the machine presents alternatives for the human to make merit judgments about. Irrespective of the success or failure of attempts at automation there appear to be a number of reasons why an in depth effort to analyze the nature of the instructions provided to students might be productive. Understanding the nature of the instructions being given is necessary in order to improve instruction in a deliberate way and in a way that can be assessed.

An interesting characteristic of introductory courses in either formal or informal logic is their reflexive nature. While the subject matter is not reasoning itself, but rather some type of normative theory about the results of reasoning, we are nevertheless presupposing that the students do possess both the ability to reason and to evaluate their own reasoning. In many respects it appears that we may be expecting the students to exhibit more sophisticated reasoning than the patterns of reasoning that they are studying. The exception may be if what is necessary to succeed is simply to learn to follow an algorithmic procedure. How similar is the reasoning we are presupposing for introductory logic and informal logic? How is the reasoning being presupposed related to the reasoning that is being studied? In the case of formal logic the reasoning being required of the students may be less sophisticated than the reasoning being required in the case of informal logic.

What are the relative advantages and disadvantages of rule based reasoning versus case based reasoning? Answering that questions requires developed views of both case-based and rule-based reasoning.

Can any of the heuristic strategies that might be used by a computer program be of use to students? I, at least, do sometimes encourage student to utilize reasoning similar to some of the heuristic strategies. In particular, hill climbing by telling them to at least find some interpretation and then concentrate on seeing if we can find an improved alternative interpretation.

This very preliminary look at the instructions of informal logic raises more questions than it answers, but hopefully prompts further discussion and analysis of those instructions.

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