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Reasoning, Argumentation and Persuasion

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ABSTRACT: In the paper I want to give a new account of notions of reasoning, argumentation, and persuasion. The aim of it is to resolve problems of the traditional accounts. The investigation uses the issue of circular reasoning (God exists, because there is God). These types of arguments are considered a fallacy in informal logic, whereas formal logic holds that they are valid. The new account suggests a possibility of reconciliation of the informal and formal perspective.

KEYWORDS: begging the question, conflict resolution, diagrams, dialectics, properties of inference, reflexivity axiom, rhetoric, truth-preservation

1. INTRODUCTION

The aim of the paper is to give a new account of reasoning, argumentation, and persuasion. In particular, I propose a specification for the notions of inference, dialectical argumentation and rhetorical (persuasive) argumentation.

In the paper, I focus on two questions: first—does formal logic describe deductive argumentation? and second—is argumentation always executed with the intention of persuading somebody? In fact, the first question amounts to the issue of the relation between reasoning described by formal systems (such as e.g. propositional logic) and deductive reasoning researched by argumentation theory or informal logic.¹ The answer to this question is especially important not only for theory of argumentation, but also for the real-life practice. That is, if the answer is negative, it means that we *cannot* use the formal systems to adequately model, study or teach even with respect to this type of argumentations which are deductive. The second question amounts to the issue of the relation between the dialectical understanding of the argumentation and its rhetorical meaning.

In order to propose the answer to the first question, I use the problem of question-begging arguments. In the paper, I focus only on the equivalency type of circular reasoning, i.e. the reasoning constructed according to the scheme “A therefore A” or “A because A” (where A is a formula). The problem of begging the question attracts a lot of attention in the literature. The main effort of those studies is to explain and analyze it, e.g.

¹ The limitation to the deductive argumentation is necessary if we consider this type of question, since formal logic do not research different types of reasoning than deduction.

to diagnose if a given circular statement commits a fallacy of begging the question.² In this paper, the problem of begging the question is investigated from a different perspective. I want to use it to specify an intrinsic property of argumentation that is not captured by the formal models of reasoning.

The paper is organized as follows. In Section 2, I overview two approaches to the issue of whether the circular reasoning is correct or not. In Section 3, I propose third approach. In Section 4, I present a model that differentiates the dialectical and rhetorical aspects of argumentation.

2. TWO SIDES OF THE BARRICADE

With respect to the problem of circular reasoning, formal and informal logic used to be situated on two sides of the barricade. Say that someone communicates:

(1) God exists, because there is God.

Is (1) a good or bad reasoning?³ In the literature, we can find two opposite approaches to this problem. It is argued that according to formal logic (1) is absolutely good, since $A \square A$ is deductively valid. On the other hand, informal logic says that (1) is a fallacy called begging the question (*petitio principii*, *circulus probandi*, arguing in a circle, etc.). Let us see how these opposite standpoints are justified.

2.1 Formal logic's approach

Argumentation theory tries to use the achievements of formal logic for the analysis of arguments.⁴ This notion is related to the notion of *logical consequence*. In formal approach, there are different conceptions of this notion, from which five are the most important: deducibility, modal, substitutional, formal and model-theoretic conception (see e.g. Hitchcock 1998, pp. 20-24, for an overview). However, no matter what conception we choose, according to the theory of this conception (1) will always be evaluated as a good reasoning.

For example, within the framework of the *deducibility conception*, given a deduction system L a formula A is a logical consequence of a set of formulas X (written: $A \in C(X)$) iff A is deducible from X in L , i.e., iff there is a finite sequence of formulas any one of which belongs to X or is an axiom of L or is obtained from previous formulas in the sequence by one of the inference rules of L . The consequence C is an operation that is applied to sets of formulas to obtain new sets of formulas (see e.g. Wójcicki 1988).

² Some circular explanations can be treated as correct or at least partly correct (Walton 2006, p. 260).

³ I limit the consideration to the correctness of such arguments ruling out the problem of their effectiveness (see e.g. (Budzynska, Kacprzak and Rembelski 2008) or (Budzynska and Kacprzak 2008) for the investigations into the aspect of persuasiveness). That is, I want to ask if the argument "God exists, because there is God" is correct, not if it could change somebody's mind about God existence.

⁴ See e.g. "it is clear that begging the question is not a fallacy that can, at least straightforwardly, be modelled in a deductive logic of propositions. For the circular argument form, 'A, therefore A,' is deductively valid." (Walton 1994, p. 95).

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Alfred Tarski (1930) specified axioms that this operation has to fulfill. In a contemporary account, it is assumed that a consequence operation C satisfies at least the conditions of reflexivity, idempotence and monotonicity:

- (A1) $X \sqsubseteq C(X)$
- (A2) $C(C(X)) = C(X)$
- (A3) if $X \sqsubseteq Y$, then $C(X) \sqsubseteq C(Y)$

The notion of consequence operation is mathematically equivalent to the notion of consequence relation \sqsubseteq between sets of formulas and formulas. One of the conditions that it should satisfy is the condition corresponding to the reflexivity axiom (A1):

if $A \sqsubseteq X$, then $X \sqsubseteq A$

Observe that if $X=\{A\}$, then $\{A\} \sqsubseteq A$. Thus, the correctness of the arguments such as (1) is guaranteed by the most basic assumption for the deducibility conception of logical consequence, i.e. by the reflexivity axiom.

Within the framework of the *formal conception*, a conclusion is a logical consequence of a set of premises iff the reasoning is an instance of a scheme of argument which has no instances with true premises and false conclusion. Thus, a conclusion “God exists” is a logical consequence of a set of one premise “there is God,” since (1) is an instance of a scheme of reasoning which has no instances with true premises and false conclusion. That is, the scheme “ A because A ” has no instances where premise A is true and conclusion A is false.

This conception rests on the relation between the logical values of premises and a conclusion used in an argument. Notice that it directly refers to the logical consequence’s property of *truth-preservation*. From this point of view, it is obvious that the circular reasoning $A \sqsubseteq A$ is good—the truth of a premise will always guarantee that a conclusion will be true (i.e. the truth will be preserved), since both of them are the same formula (once an instance of A is true in a premise, it cannot cease to be so in a conclusion).

2.2 Informal logic’s approach

On the other hand, informal logic advocates that the circular reasoning is a bad argument.⁵ Walton claims that such scheme of reasoning fails to fulfill the probative function which is characteristic for argumentation (Walton 2006, p. 248). His argument could be reconstructed in the following manner. Let $A \sqsubseteq B$ be a reasoning. The formula B , which is supposed to be a conclusion of the argumentation, is questioned (dubious). This represents the *dialectical* approach to reasoning.⁶ For Aristotle, a reasoning starts with a problem, e.g. “Is ‘an animal that walks on two feet’ a definition of man or no?” (*Topics* 101b). This means that the problem expresses doubt (conflict) about what a standpoint should be adopted, i.e. whether B should be accepted or $\neg B$ should be accepted.

⁵ In this paper, I do not consider the epistemic model of begging the question.

⁶ See (Walton 1994, pp. 96-104) for the discussion on the assumption of dialectical structure of argumentation in the context of begging the question fallacy.

The next step in the procedure is the intention of removing the doubt about B with the use of some A . However, A could be also dubious. In begging the question strategy, in order to remove the doubt about A , we use B . However, we cannot accomplish this task since B is still dubious. We could represent this procedure in the following manner:

1. $?B$ (i.e., B is dubious) – *dialectical assumption*
2. we want to use A to remove $?B$ (i.e., doubts about B)
3. but $?A$
4. *question-begging strategy*: we want to use B to remove $?A$
5. but $?B$ (see point 1.), thus B cannot remove $?A$.

This procedure covers the equivalence conception as a special case. Say that one wants to argue $A \square A$. This means that A in the conclusion is dubious. In order to remove doubts about A , one wants to use A as a premise. However, A is dubious, thus it cannot remove doubts about the conclusion A .

Another interesting way to justify the view that circular reasoning is fallacious is proposed by van Eemeren and Grootendorst (van Eemeren and Grootendorst 2004, pp. 176-177). Similarly, their account assumes the dialectical nature of argumentation. They suggest that “its lack of soundness must be a result of something other than invalidity” (van Eemeren and Grootendorst 2004, p. 176), i.e. it is a result of violating the rules for a critical discussion. Their argument can be described in the following way:

1. conflict as a starting point: a proponent puts forward some standpoint A and an opponent questions A – *dialectical assumption*,
2. this means that: there is no agreement with respect to A ,
3. *third rule for a critical discussion* states: if an attempt to resolve a conflict is to have a chance of success, then the parties of the conflict have to adopt a number of formulas accepted by both of the parties,
4. thus: the formula A cannot be used to this end (see point 2.).

In the next section I suggest the third way to approach the issue of whether circular reasoning is correct or incorrect.

3. THE THIRD WAY

If an argumentation understood in the dialectical manner is not allowed to be circular, and in the formal approach a reasoning following the pattern $A \square A$ is valid, then maybe dialectical reasoning and formal reasoning are two *different types of processes*. Or at least their description requires focusing on *different types of properties* that these processes have in different contexts of use. In the literature, the idea that reasoning can be used for different purposes is well known. It can be used to argue, explain, persuade, etc.⁷

⁷ For example:

reasoning normally occurs in a framework of use (pragmatic framework). Often, the framework of use is argument. Reasoning does not necessarily or always occur in argument, however. A participant can reason in a game of chess, for example. (Walton 1990, p. 411)

However, there is no stress on the distinction between formal and dialectical use which leads to different perspectives that formal logic and informal logic (or argumentation theory) adopt. These differences in perspective emerge and become especially noticeable with respect to the problem of begging the question.

Walton says: “Precisely what is wrong with circular reasoning, when it is wrong, it can be argued, stems from the pragmatic and contextual notion of how an argument is used for some probative purpose (to prove something) to another arguer” (Walton 2006, s. 245). What he suggests is that when a reasoning is supposed to fulfill the *probative function*, its essential property is not to work according to the rule of circular reasoning. The probative function is the one that should be fulfilled in the *dialectical framework*: when the statement is questioned, to propose an argument means to propose a reasoning that is supposed to prove the dubious statement. In this section, I consider the possibility of constructing a logical model describing a dialectical type of inference. The model allows us to understand the dialectical inference in two ways. We can treat it as corresponding to the essentially different process than reasoning described by the deductive systems. The other possibility is to understand the dialectical inference as corresponding to the same process as the formal inference, but theory of the first one would concentrate on different aspects of this process than the theory of the second one, and as a result they would study different properties of this process.

3.1 Types of inferences

Let inference \square be a relation between sets of formulas and formulas in a given formal language.⁸ For example, the inference relation could be a following set of ordered pairs:

$$\square = \{(\{A\}, A), (\{A, B\}, A \wedge B), (\{A \wedge B\}, A), (\{A \rightarrow B, A\}, B), \dots\}.$$

Further, let *scheme of reasoning* be an element of a given inference and *reasoning* be an instance of the reasoning’s scheme. For example, (1) is a reasoning that is an instance of a scheme that is the first element of the inference described above (i.e., $(\{A\}, A)$).

If we assume that there are different types of reasoning depending on the purpose it should fulfill in a given context of use, then we could distinguish different types of inference, in particular: a formal and a dialectical one. The purpose of the formal inference \square^{form} is truth-preservation, while the purpose of the dialectical inference \square^{dial} is doubt-elimination (or conflict-resolution). In this account, the reasoning (1) could have different interpretation depending on the purpose this reasoning is to fulfill in a given communication situation. Say that there are two different situations:

or:

In a speech act event, logical inferences need not always have the argumentative function of convincing another language user; they may also be part of an explanation or other complex speech act. (van Eemeren and Grootendorst 1992, p. 10).

⁸ In this paper, I do not explore the nature of necessity that underlies the notion of inference (consequence). See e.g. (Hitchcock 2009) for an overview. Hitchcock examines the conditions of extending the notion of inference so that transformations (from premises into conclusion) make use of extra-logical constants.

- (2) There is God \square^{form} God exists
 (3) There is God \square^{dial} God exists

Intuitively, a proponent of (2) informs that transformation of the statement “There is God” into the statement “God exists” will preserve the truthfulness. A proponent of (3) informs that the statement “There is God” will remove the doubt (or resolve the conflict) concerning the statement “God exists.” Clearly, there is nothing wrong with the first information, while the second one can be accused to be false – we cannot remove doubt (conflict) about a statement with the use of the statement itself (see the arguments of Walton and van Eemeren-Grootendorst in the previous section).

Such the model allows us to express directly in the language those two purposes for which we can use a reasoning. As a result, it is easy to separate in the logical model those situations when a circular reasoning is good (once it is performed in the formal context of truth-preservation) from the situations when a circular reasoning commits the fallacy of begging the question (while it is performed in the dialectical context of conflict-resolution). Obviously, this does not resolve the problem how to *diagnose* whether a given circular statement commits the fallacy. However, once we identify the context of use, we can *express* it in the model proposed in this paper.

This does not mean that in the argumentation process we have to use just the dialectical inferences. The only limitation is that we cannot use the formal inference with respect to the dubious statements. These are conclusions (elements of the codomain) of the dialectical inferences. However, on the path to this conclusion, we could make several transformations of a formal kind (in particular, the circular ones), as long as the last transformation (leading to the dubious statement) will be of a dialectical kind.

The differences between (2) and (3) with respect to the begging the question suggest that those two kinds of inferences have *different properties*. Let us assume that the equivalency type of circular reasoning is fallacious in the dialectical context and that the conclusion in the dialectical inference is always a statement, which is in doubt before the reasoning is executed. Then, we could formulate the first difference between the formal and dialectical inference as follows:

- for every A: A \square^{form} A
 for every A: it is not the case that A \square^{dial} A.

This means that the formal inference is reflexive while the dialectical one—irreflexive. For example, the inference

$$\square = \{(\{A\}, A), (\{A, B\}, A \wedge B), (\{A \wedge B\}, A), \dots\}$$

could be only a formal inference since $(\{A\}, A) \in \square$. To make it the dialectical inference, we must eliminate such pairs, e.g.

$$\square^{\text{dial}} = \{(\{A, B\}, A \wedge B), (\{A \wedge B\}, A), \dots\}.$$

3.2 Argument diagramming

The tool used to broadly represent and analyze argumentation is the graph-theoretic method of argument diagramming. A *directed graph (digraph)* is a pair

$$D = (V, \mathcal{A}),$$

where V is a set of vertices (nodes) and \mathcal{A} is a set of arrows (directed edges) which are 2-element ordered pairs of V . In argument diagramming, nodes represent formulas (premises or conclusions), while edges represent inferences. An analysis of begging the question with the use of this method is proposed in Walton and Batten 1984. The model presented in my paper offers an extension for their analysis. In the account proposed, the digraph should be extended by introduction of two *types of arrows*. That is, a digraph is a pair

$$D = (V, \mathcal{A}_{\text{form}}, \mathcal{A}_{\text{dial}}),$$

where arrows of a type $\mathcal{A}_{\text{form}}$ represent \square_{form} , and arrows $\mathcal{A}_{\text{dial}}$ represent \square_{dial} . The reflexivity of the relation \square_{form} allows loops for the arrows $\mathcal{A}_{\text{form}}$, where loop is an edge which starts and ends on the same vertex. The irreflexivity of \square_{dial} disallows loops for $\mathcal{A}_{\text{dial}}$.

Let the formal inference be illustrated by a solid line and the dialectical inference - by a broken line. In Fig.1 below, a scheme $A \square A$ is modeled as a loop. However, depending on the type of inference, a loop either is acceptable or not. That is, in the case 1a the loop means that the formula A is transformed into A with truth-preservation. Such transformation is allowed and could be executed by, e.g., some computing program. In the case 1b, the loop is incorrect, since this arrow represents the dialectical inference. The question can be raised: does it mean that we could not have loops in the argumentation process in general? The answer is: we can, as long as they are not on the dialectical arrows. For example, 1c does not commit the fallacy of begging the question, since it makes a circle(s) from A to A , but then uses A to resolve a conflict about something “outside” a circle, i.e. about B . In other words, the core of the argument here is $A \square_{\text{dial}} B$ and the loop $A \square_{\text{form}} A$ is reducible. Thus, someone is running in a circle, but it does not affect the main part of the argument which is not circular.

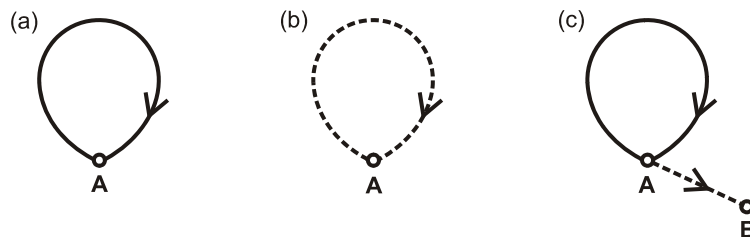


Fig.1 Equivalency type of circular reasoning: (a) for formal inference, (b) for dialectical inference, (c) mixed situation.

Observe that the condition of irreflexivity was assumed by Aristotle: “reasoning is an argument in which, certain things being laid down, something other than these

necessarily comes about through them” (Topics 100a). The words “something other than these” suggest that “the father of logic” has a concept of reasoning that does not allow one to repeat the premise in the conclusion. Thus, the logical model of his concept of the reasoning, as well as any logical model of inference understood in the dialectical meaning, cannot assume the reflexivity of inference as it is assumed in all formal deductive systems such as propositional logic or first-order logic.

4. DIALECTICS AND RHETORIC

The second aim of the paper is to consider the question whether dialectical argumentation has to be executed with an intention of persuading somebody. In argumentation theory, the notion of the argumentation (argument) is related to the notion of conflict, e.g. “Argument is a social and verbal means of trying to resolve, or at least to contend with, a conflict” (Walton 1990, p. 411).⁹ Nevertheless, there is also a tendency to relate the notions of argumentation or conflict to the persuasive function of messages (see e.g. van Eemeren and Grootendorst 2004, p. 2, or the notion of critical discussion (persuasion dialogue) in Walton 1990, pp. 412-413 and in Walton and Krabbe 1995, p. 66-72). The strength of such the model is its simplicity. Moreover, it represents the type of the dialectical argumentation that is the most common in real-life practice. However, the model that merges the dialectical and rhetorical aspects of argumentation can be insufficient for some applications.

In Fig.2 below, I propose a specification of dialectical and rhetorical (persuasive) argumentations. In the dialectical case, an argumentation starts with a conflict and the goal of a dialectical game is to resolve it. In the rhetorical case, the sender wants to influence the receiver. Observe that in such the model, the termination of a *dialectical game* does not have to be related to the “egoistic” aims of disputants (i.e., they are not attached to their own standpoints). Say that the sender believes (or is committed to) A at the beginning while the receiver believes (or is committed to) $\neg A$. However, they are not “egoistic”—they do not care whether their own point of view wins. They only concentrate on the resolution of the conflict—e.g. the sender does not care if A wins, he plays the game just to find out which of these two standpoints is right. This type of argumentation is successful when any of the disputants wins.

⁹ See e.g. Walton 1990, pp. 410-411 for discussion on the relation between the notions of argumentation and argument.

Dialectical argumentation	Rhetorical argumentation
<p>Start: ?A (i.e., conflict: A vs. $\neg A$)</p> <p>Game:</p> <p>End: the game is terminated, if disputants justify one statement from the set {A, $\neg A$}</p>	<p>Start: A sender wants to influence a receiver to accept A</p> <p>Game:</p> <p>End: the game is terminated, if the receiver accepts A</p>

Fig.2 The differences between dialectics and rhetoric

On the other hand, *rhetorical game* is “egoistic,” i.e. a sender of *A* is interested only in the situation when *A* wins. That type of argumentation is successful for a given disputant when this disputant wins. In this model, a rhetorical success is always a dialectical one, but not opposite (when one specific disputant wins, then some disputant wins). Furthermore, if we assume that the sender wants to persuade the receiver of *A* only when they disagree about *A*, then the rhetorical argumentation is the dialectical one (and not opposite) and the persuasive inference \square_{rhet} inherits the properties from \square_{dial} .

5. CONCLUSION

Let us return to the questions raised in the introduction. The first question was: does *formal logic* describe *deductive argumentation*? The answer is: no, if we want to model argumentation in the dialectical meaning. The reason is that formal logic describes the inference that does not fulfill the function required for dialectical argumentation, i.e. formal inference is to preserve the truth, not to resolve a conflict or remove a doubt.

Walton notices that: “Formal logic abstracts from the content of the premises and conclusion of an argument, calling them propositions. *Informal logic* must interpret the uses of these propositions as speech acts in a context of dialogue” (Walton 1990, pp. 417-418). This paper shows that the difference between formal and informal logic reaches even deeper. This difference is not only on the level of reasoning’s content. It starts from the level of the form of reasoning that those two disciplines investigate. In fact, they concentrate on different types (or aspects) of inferences that have different formal properties (see Table 1). Thus, if this hypothesis is right, there is a need for theories describing them separately. The formal inference is well-studied by logical systems such as propositional logic. What we would need now is logical models of the dialectical and rhetorical types of inferences. This gives a chance for reconciliation of the informal and formal perspective. There is no sense to ask if “God exists, because there is God” is a good reasoning in general, since we have different types (aspects) of reasoning. We need to specify which one we have in mind. Each logic—formal or informal—has its own research scope. They are not rivals, but complementary theories. Thus, we should determine to what type of context use we want to refer, and address a logic that works

with that context. If I want to ask about truth-preservation, then I should look for the answer in formal systems. But when I want to ask about conflict–resolution, then I should turn to theories of the dialectical argumentation.

	formal inference	dialectical inference	rhetorical inference
	\vdash^{form}	\vdash^{dial}	\vdash^{rhet}
function (context of use)	truth-preservation	conflict–resolution (doubt-elimination)	influence on receiver
correctness of circular reasoning	correct	fallacious	fallacious
formal property (wrt begging the question)	reflexive for every $A: A \vdash^{\text{form}} A$	irreflexive for every A : it is not the case that $A \vdash^{\text{dial}} A$	irreflexive for every A : it is not the case that $A \vdash^{\text{rhet}} A$
loops in graph	allowed	disallowed	disallowed

Table 1. Different types of inferences and their description.

The second question raised in the introduction was: is *argumentation* always executed with the intention of *persuading* somebody? Although it is a common to assume that it is, I showed in this paper that we may need a model where the dialectical and rhetorical aspects are separated. We can specify the rhetorical inferences as a subclass of the dialectical inferences. Then, \square_{rhet} will inherit the properties from \square_{dial} (e.g. irreflexivity—see Table 1).

This paper presents the basic distinction between those types of inferences. This is just the first step toward creating a logical model of dialectical or rhetorical reasoning. The future work should address the issues such as: (a) other differences in the properties of those inferences (analysis of fallacies, e.g. dependency circular reasoning suggests that the dialectical inference should not be symmetric); (b) formal models of the dialectical or rhetorical argumentations (e.g. is it possible to provide an axiomatization?, is there any other way to formally express the limitations of the dialectical inference assumed by begging the question?); (c) other types of inferences (e.g. explanation as an inference with clarifying function).

Commentary not submitted
[Link to reply](#)

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