Why missing premises can be missed: Evaluating arguments by determining their lever

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Why missing premises can be missed: Evaluating arguments by determining their ‘lever’

JEAN H.M. WAGEMANS

Abstract: Traditional conceptualizations of argument usually include a ‘connecting premise’ or ‘warrant’ that needs to be added by the analyst when missing from the original discourse. This paper provides an alternative to adding such missing premises from a list of predefined argument schemes by using the framework of the Periodic Table of Arguments (PTA). It describes the Argument Type Identification Procedure (ATIP) and explains how to derive the so-called ‘lever’ of an argument from its identification.

Keywords: argument evaluation, argument scheme, connecting premise, missing premise, Periodic Table of Arguments, warrant

1. Introduction

The Periodic Table of Arguments (PTA) is a recently developed categorization of argument that integrates the existing dialectical and rhetorical accounts of argument schemes, fallacies, and other means of persuasion into a systematic and comprehensive whole (Wagemans 2016, 2019). Like any overview of argument types, the PTA can, in principle, be used to develop methods for the production, the analysis, and the evaluation of argumentative discourse. So far, it has primarily been used for analytical purposes.¹

Different from many other approaches to argument categorization, the PTA takes an argument to consist of one conclusion and one premise. In doing so, it excludes what is traditionally called the ‘connecting premise’ or ‘warrant’ from being conceptualized as an integrating part of an argument. One reason for doing that is to avoid an infinite regress problem: if the link between the premise and the conclusion is added to the argument as a premise, the link between that linking premise and the conclusion should also be added as a premise, ad infinitum (see Wagemans 2014, pp. 15-17).

Another, perhaps even more important reason for working with this minimal conceptualization of argument is to dissuade the analyst of argumentative discourse from projecting into the discourse all kinds of preconceived ideas about what an argument should consist of to be ‘correct’, ‘valid’, or ‘complete’ in any sense of the term. For such projection, if not accounted for by explicit methodological considerations, invites the analyst to the hermeneutic activity of ‘hineininterpretieren’. This is problematic because any crossing of the border between providing a theoretically informed description and giving a subjective reconstruction of the original discourse may interfere with the subsequent assessment of the argument under scrutiny.

After having thus introduced a theoretical as well as a more practical reason for why the PTA takes an argument to consist of one conclusion and one premise, I would like to briefly indicate the consequences of this choice for applying the categorization for analytical purposes.

¹ The argument categorization framework of the PTA has been integrated into the linguistic representation framework of Constructive Adpositional Grammars (CxAdGrams) (Gobbo and Wagemans 2019a, 2019b, 2019c; Gobbo, Benini and Wagemans 2019) and it has been used for annotating argument schemes in natural discourse (Visser and Wagemans 2018; Visser et al. 2018, 2019, 2020).
I will do so by contrasting the general characteristics of its method for identifying arguments in natural discourse with those of the traditional method.

Existing classifications of arguments developed within the field of argumentation theory usually consist of a list of argument schemes, each of which has a predefined set of characteristics. To determine the type of an argument found in natural discourse, this set of characteristics is used as an ideal. The identification of the natural argument takes place by comparing the ideal to the real, and in case discrepancies are found, by subsequently using the ideal to reconstruct the real. In other words, the analyst uses the list of predefined argument schemes to find what should have been expressed in the original discourse but for unconscious, habitual, or strategic reasons has been expressed differently or remained completely absent from the discourse and to “repair” or “reconstruct” it accordingly.

This traditional method raises several problems, which I will illustrate by imagining a predefined argument scheme that consists of one conclusion and three premises – see Figure 1 – and an analyst who, in trying to match the elements of the scheme with the text under scrutiny, found the conclusion and premise 2 in the original discourse but was not able to detect premise 1 in the original discourse (?) and found something that could be interpreted as an instantiation of premise 3 but was formulated in a slightly different way (premise 3’).

<table>
<thead>
<tr>
<th>predefined argument scheme</th>
<th>original discourse</th>
</tr>
</thead>
<tbody>
<tr>
<td>conclusion</td>
<td>conclusion</td>
</tr>
<tr>
<td>premise 1</td>
<td>?</td>
</tr>
<tr>
<td>premise 2</td>
<td>premise 2</td>
</tr>
<tr>
<td>premise 3</td>
<td>premise 3’</td>
</tr>
</tbody>
</table>

Figure 1. Abstract example of discrepancies between the ideal and the real

Should the analyst now add an instantiation of premise 1 as a missing premise to the original discourse and correct the formulation of premise 3’ so as to achieve conformity with premise 3? How to justify such reconstruction? Which hermeneutic considerations or interpretation rules allow the analyst to transform the original discourse to have it correspond with the predefined set of characteristics of the argument scheme from the list? And how to choose which of the argument schemes mentioned on the list is the most fitting one in the first place? How many discrepancies are allowed for the analyst to conclude that the identification of the argument type is still the right one? And even if there is only a minor discrepancy, why wouldn’t it be just another type of argument, one that is not yet mentioned in the list?

These questions all point to the same problem of the traditional method of identifying argument types, namely that it is based on a comparison between the ideal and the real. There is a list of predefined types of argument and it is left to the analyst to compare the items on the list to the argument in the original discourse. On the basis of mostly implicit criteria for correspondence or similarity, the analyst then takes a subjective decision regarding the identification of the argument type.

Different from such comparative approaches, the PTA takes a procedural approach to argument type identification and evaluation. This means that there are explicit instructions as to when, how and why the analyst should transform the original discourse. But it also means that there are no ‘missing premises’ that have to be added to the discourse only to comply with the arbitrary characteristics of some predefined argument scheme. This applies a fortiori to the ‘connecting premise’ that is meant to express the connection between premise and conclusion.

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for that would not only give rise to the problems about the justification of the argument type identification just described but also to the infinite regress problem described earlier.

Taking an argument to consist of one conclusion and one premise, however, also raises an important question. If the PTA excludes what is traditionally called the ‘connecting premise’ or ‘missing premise’ from its conceptualization of argument, how can the categorization be used to evaluate the quality of the connection between premise and conclusion? In this paper, I aim to answer that question by explaining how to derive the so-called ‘argument lever’ (Wagemans 2019, p. 61) from the identification of the type of argument in terms of the theoretical framework of the PTA.

The paper is structured as follows. First, in Section 2, I expound the relevant aspects of the theoretical framework of the PTA, focusing on the role of the notions ‘argument form’ and ‘argument substance’ in the description of the characteristics of the types of argument. Next, in Section 3, I explain how the analyst can use the Argument Type Identification Procedure (ATIP) to provide the systematic name of any argument found in natural discourse. Then, in Section 4, I illustrate through an example how the analyst can formulate the lever of such an argument and use it to evaluate the quality of the connection between its premise and conclusion. Finally, in Section 5, I summarize the most important findings and indicate directions for further research.

2. Characteristics of natural arguments

When viewed from a purely linguistic perspective, an analyst who found an argument in a text has found two statements and – on a lucky day – also a connector. As soon as the analyst labels one of these statements as the ‘conclusion’ and the other as the ‘premise’, the perspective has already shifted from linguistics to pragmatics. For labelling statements with their argumentative function means to assume that one statement is doubted and the other is more certain in the eyes of an addressee, as well as taking the latter statement to be put forward by the arguer to establish or increase the acceptability of the former. These pragmatic insights are reflected in a wide range of descriptions of argument varying from Quintilian’s classical rhetorical definition of an argument as ‘the reason that, through things that are certain, provides credibility to that which is dubious (ratio per ea, quae certa sunt, fidem dubiis adferens) (Institutio oratoria 5, 10, 8 and 20)’ to van Eemeren and Grootendorst’s observation that the arguer ‘acts on the assumption that others either doubt or might doubt the acceptability of his standpoint’ and therefore that ‘the purpose of his discourse is to convince someone else of the acceptability of his standpoint’ (1992, p. 14).3

<table>
<thead>
<tr>
<th>linguistic content</th>
<th>pragmatic function (epistemic status)</th>
</tr>
</thead>
<tbody>
<tr>
<td>statement</td>
<td>conclusion (doubted)</td>
</tr>
<tr>
<td>connective (e.g., “because”)</td>
<td>acceptability leverage</td>
</tr>
<tr>
<td>statement</td>
<td>premise (certain)</td>
</tr>
</tbody>
</table>

Figure 2. An argument viewed from a linguistic and pragmatic perspective

Apparently, and this is also clear from the above general definition of argument, the analyst is only justified in calling a combination of statements an ‘argument’ and attributing the labels of

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3 These quotations have been taken from a short survey of classical and contemporary definitions of argument (see Wagemans 2019, pp. 58-60).
‘conclusion’ and ‘premise’ to these statements if it can be shown that there is some kind of leverage of acceptability going on from the premise to the conclusion. Now the big question to answer here is the following: “How does this leverage of acceptability take place?” How is it possible that the arguer, as soon as they assume the addressee to have some doubt concerning the acceptability of a particular statement, can provide another statement that makes the addressee accept the former? What is the underlying mechanism at work here?

Within the theoretical framework of the PTA, this question is answered by hypothesizing the so-called ‘law of the common term’. This law states that the premise, in order to fulfil its pragmatic aim of rendering the conclusion (more) acceptable, should share exactly one common term with the conclusion. Expressed in mechanistic metaphoric, this common term functions as the ‘fulcrum’ of the leverage of acceptability taking place within the argument.

Assuming that a statement consists of a subject and a predicate, the law of the common term yields two basic possibilities of argument forms. If the statements share the same subject, the argument has the form ‘a is X, because a is Y’ and is characterized as a ‘predicate argument’ (abbreviated as ‘pre’). In this case, the subject (a) functions as the fulcrum of the argument. A concrete example is Unauthorized downloading (a) is not theft (X), because unauthorized downloading (a) does not deprive the original owner of the use of an object (Y), which has unauthorized downloading (a) as its fulcrum.

The other basic possibility is when the common term is the predicate, which means the argument has the form ‘a is X, because b is X’. In this case, the predicate (X) is the fulcrum. Within the framework of the PTA, such arguments are called ‘subject arguments’ (abbreviated as ‘sub’). An example is Cycling on the grass (a) is prohibited (X), because walking on the grass (b) is prohibited (X), which has is prohibited (X) as its fulcrum.

In natural argumentative discourse, any statement can be expressed as a proposition or as an assertion. The difference between the two modes of expression is that in the latter, the arguer’s doxastic attitude regarding the statement is explicitly present in the discourse. The statement The president is doing a great job, for example, is expressed as a proposition, while the statement I believe that the president is doing a great job is expressed as an assertion. While both statements contain the proposition the president is doing a great job, the assertion additionally contains the doxastic attitude marker I believe that (see Figure 3).

![Figure 3](image)

The same statement expressed as a proposition and as an assertion

Within the theoretical framework of the PTA, the distinction between propositions and assertions is used to characterize arguments as ‘first-order arguments’ (abbreviated as ‘1’) or ‘second-order arguments’ (abbreviated as ‘2’). If the propositions of the statements share a common subject or predicate, like in the examples above, the argument is characterized as a ‘first-order predicate argument’ (‘1 pre’) or ‘first-order subject argument’ (‘1 sub’) respectively. If the statements have the proposition of the conclusion as their common element, the argument has the form ‘q is T, because q is Z’, with ‘T’ standing for ‘true’, a standard
formulation of the doxastic attitude marker that may or may not have been expressed in the actual discourse and can be added or substituted by the analyst. Such a ‘second-order predicate argument’ (‘2 pre’) has the shared proposition \(q\) as its fulcrum. An example is *We only use 10% of our brain (q) is true (T), because we only use 10% of our brain (q) is said by Einstein (Z)*, which has *we only use 10% of our brain (q) as its fulcrum. And finally, if the statements contain entirely different propositions, they have the doxastic attitude marker as their common element. Such arguments are called ‘second-order subject arguments’ (‘2 sub’) and have the form ‘\(q\) is T, because \(r\) is T’. An example is *He must have gone to the pub (q) is true (T), because the interview is cancelled (r) is true (T)*, which has ‘is true’ (T) as its fulcrum.

To summarize, the PTA in describing the characteristics of natural argument distinguishes between predicate and subject arguments as well as between first-order and second-order arguments. These characteristics are taken together in the notion of ‘argument form’, of which there are four: first-order predicate arguments (‘1 pre’) taking the form ‘\(a\) is \(X\), because \(a\) is \(Y\)’; first-order subject arguments (‘1 sub’) taking the form ‘\(a\) is \(X\), because \(b\) is \(X\)’; second-order subject arguments (‘2 sub’) taking the form ‘\(q\) is T, because \(r\) is T’; and second-order predicate arguments (‘2 pre’) taking the form ‘\(q\) is T, because \(q\) is \(Z\)’. In the visualization of the PTA, arguments that share the same form are situated in the same quadrant, as pictured in Figure 4.

![PERIODIC TABLE OF ARGUMENTS](image)

**Figure 4.** The four quadrants of the PTA reflect the four basic argument forms

The third characteristic of arguments that constitutes the theoretical framework of the PTA is the so-called ‘argument substance’, i.e., the specific combination of types of statements. This characteristic is determined on the basis of a widely used typology of statements that is developed in debate theory and distinguishes between statements of fact (F), statements of value (V), and statements of policy (P). An argument can thus be said to substantiate one of nine possible different combinations of types of statements, conventionally starting with the type of statement expressed in the conclusion followed by that in the premise: PP, PV, PF, VP, VV, VF, FP, FV, FF. *The government should invest in jobs, because this will lead to economic growth*, for instance, can be characterized as a PF argument, since it combines a statement of policy (P) in its conclusion with a statement of fact (F) in its premise.
As is clear from this exposition, the analyst, in order to identify the type of any natural argument under scrutiny in terms of the PTA, should classify it in terms of the three constituents of its theoretical framework, namely as (1) a first-order or second-order argument; (2) a predicate or subject argument; and (3) as one out of nine possible combinations of types of statements. The superposition of these three partial characterizations yields what is called the ‘systematic name’ of the argument. To illustrate this notion, Table 1 provides the systematic names of the examples of arguments discussed above.

<table>
<thead>
<tr>
<th>example</th>
<th>argument form</th>
<th>argument substance</th>
<th>systematic name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unauthorized downloading (a) is not theft (X) (V), because unauthorized downloading (a) does not deprive the original owner of the use of an object (Y) (F)</td>
<td>first-order predicate argument (1 pre)</td>
<td>value supported by fact (VF)</td>
<td>1 pre VF</td>
</tr>
<tr>
<td>Cycling on the grass (a) is prohibited (X) (V), because walking on the grass (b) is prohibited (X) (V)</td>
<td>first-order subject argument (1 sub)</td>
<td>value supported by value (VV)</td>
<td>1 sub VV</td>
</tr>
<tr>
<td>He must have gone to the pub (q) is true (T) (V), because the interview is cancelled (r) is true (T) (V)</td>
<td>second-order subject argument (2 sub)</td>
<td>value supported by value (VV)</td>
<td>2 sub VV</td>
</tr>
<tr>
<td>We only use 10% of our brain (q) is true (T) (V), because we only use 10% of our brain (q) is said by Einstein (Z) (F)</td>
<td>second-order predicate argument (2 pre)</td>
<td>value supported by fact (VF)</td>
<td>2 pre VF</td>
</tr>
</tbody>
</table>

Table 1. Systematic names of examples instantiating the four basic argument forms

Assuming these three constituents and the corresponding possibilities, the PTA distinguishes between $2 \times 2 \times 9 = 36$ systematic types of argument. While situating argument types that share the same form in the same quadrant, the additional constituent of the argument substance is added to the visualization of the PTA by horizontally distributing the combinations in the systematic variation pictured in Figure 5.
3. The Argument Type Identification Procedure (ATIP)

As said above, the PTA does not include what is traditionally called a ‘connecting premise’ or ‘missing premise’ in its conceptualization of argument. Instead, the analyst using the PTA for evaluative purposes derives what is called the ‘argument lever’ from the identification of the argument. In this section, I describe how such identification takes place by presenting the most recent version of the so-called ‘Argument Type Identification Procedure (ATIP)’, which is developed to help the analyst to identify the type of any argument expressed in natural language. The ATIP starts with a functional analysis of the elements of the two statements that have been recognized as the ‘conclusion’ and the ‘premise’ of the argument under scrutiny and results in labelling that argument with a systematic type indicator that summarizes its characteristics. The procedure consists of several steps, which are explained below and illustrated through an example.

Step 1 – Label the textual elements

The theoretical framework of the PTA takes an argument to consist of two connected statements, one functioning as the ‘conclusion’ and the other as the ‘premise’ (Wagemans 2019, p. 60). To identify the type of argument, the analyst should first label its textual elements based on their pragmatic function. The following labels are in use:

- the text may contain a ‘connector’ such as because or therefore indicating the function of the statements as ‘conclusion’ and ‘premise’ (for lists of such indicators see, e.g., van Eemeren, Houtlosser and Snoeck Henkemans 2007; Stab and Gurevych 2017)
- the statements usually contain a ‘subject’, i.e., an entity about which something is said, and a ‘predicate’, i.e., what is said about that entity
- the subject and predicate together form the ‘propositional content’ of the statement
- apart from this propositional content, the statement may contain a ‘doxastic commissive’ such as we believe that, it is true that, and in my humble opinion, which are linguistic expressions of the arguer’s commitment regarding the acceptability of the propositional content (Wagemans 2019, pp. 62-64)
- the statement may also contain a ‘doxastic directive’ such as you should accept that, which is a linguistic expression of the arguer’s goal of convincing the addressee of the acceptability of the propositional content of the conclusion.

Example 1 – original text
Since the suspect left a long trace of rubber on the road, we believe that he was driving fast

Functional analysis of the elements of the statements

<table>
<thead>
<tr>
<th>element</th>
<th>function</th>
</tr>
</thead>
<tbody>
<tr>
<td>since</td>
<td>connector</td>
</tr>
<tr>
<td>the suspect left a long trace of rubber on the road</td>
<td>propositional content (premise)</td>
</tr>
<tr>
<td>the suspect</td>
<td>subject (premise)</td>
</tr>
<tr>
<td>left a long trace of rubber on the road</td>
<td>predicate (premise)</td>
</tr>
<tr>
<td>we believe that</td>
<td>doxastic commissive (conclusion)</td>
</tr>
<tr>
<td>he was driving fast</td>
<td>propositional content (conclusion)</td>
</tr>
<tr>
<td>he</td>
<td>subject (conclusion)</td>
</tr>
<tr>
<td>was driving fast</td>
<td>predicate (conclusion)</td>
</tr>
</tbody>
</table>

4 The version presented here is adapted from Wagemans (2020).
**Step 2 – Standardize the argument**

The labelling of the elements of the argument enables the analyst to reformulate it in the standard form “conclusion, because premise”, mentioning the subject and predicate of both. Such standardization may involve several transformations of the original text:

- regarding the statements
  - reordering of the statements to reflect the standard form “conclusion, because premise”
- regarding the connector
  - addition of the standard connector *because* between the conclusion and the premise
  - substitution of the original connector by the standard connector *because*
- regarding the non-propositional elements of the statements
  - hiding of the doxastic commissives and directives
- regarding the propositional content of the statements
  - anaphora resolution, i.e., the substitution of specific elements so that identical entities are referred to by identical words (preferably the most informative ones)
  - changing active to passive voice or the other way around in order to find a common subject or predicate.

<table>
<thead>
<tr>
<th>Example 1 – original text</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Since the suspect left a long trace of rubber on the road, we believe that he was driving fast</em></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reformulations toward the standardized version</th>
<th>Transformation</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>We believe that he was driving fast, since the suspect left a long trace of rubber on the road</em></td>
<td>reordering of the statements</td>
</tr>
<tr>
<td><em>We believe that he was driving fast, because the suspect left a long trace of rubber on the road</em></td>
<td>substitution of the connector <em>since</em> by <em>because</em></td>
</tr>
<tr>
<td><em>He was driving fast, because the suspect left a long trace of rubber on the road</em></td>
<td>hiding of the doxastic commissive <em>we believe</em></td>
</tr>
<tr>
<td><em>The suspect was driving fast, because the suspect left a long trace of rubber on the road</em></td>
<td>substitution of <em>he</em> by the suspect (anaphora resolution)</td>
</tr>
</tbody>
</table>

**Step 3 – Determine the argument form**

The ‘argument form’ is an abstract representation of the specific constellation of the subjects and predicates expressed in the conclusion and the premise of the argument. Closely following logical conventions, subjects are indicated with letters *a, b*, etc., predicates with letters *X, Y*, etc. (predicates *T* and *L* expressing doxastic commitments ‘true’ and ‘false’), and complete propositions with letters *p, q*, etc.

Within the theoretical framework of the PTA, four basic argument forms are distinguished, which is reflected in the visual representation of the table as divided into four quadrants (Wagemans 2019, pp. 64-67). Table 2 contains an overview of these forms, their names, and the corresponding quadrant of the table:
Table 2. Argument forms distinguished in the PTA

For completing this step in the procedure, the analyst can use the decision tree pictured in Figure 6, which contains three heuristic questions as well as the corresponding instructions and outcomes depending on the answers to these questions.

<table>
<thead>
<tr>
<th>argument form</th>
<th>name</th>
<th>quadrant</th>
</tr>
</thead>
<tbody>
<tr>
<td>$a$ is $X$, because $a$ is $Y$</td>
<td>first-order predicate argument</td>
<td>alpha</td>
</tr>
<tr>
<td>$a$ is $X$, because $b$ is $X$</td>
<td>first-order subject argument</td>
<td>beta</td>
</tr>
<tr>
<td>$q$ is $T$, because $r$ is $T$</td>
<td>second-order subject argument</td>
<td>gamma</td>
</tr>
<tr>
<td>$q$ is $T$, because $q$ is $Z$</td>
<td>second-order predicate argument</td>
<td>delta</td>
</tr>
</tbody>
</table>

The argument *The suspect was driving fast, because the suspect left a long trace of rubber on the road* instantiates the form « $a$ is $X$, because $a$ is $Y$ ». It is a first-order predicate argument that is situated in the Alpha Quadrant. This result is achieved by running the reformulated version of the argument through the decision tree for determining the argument form.

**Determination of the argument form**

Are the subjects of the reformulated statements the same?

YES → The argument has the form « $a$ is $X$, because $a$ is $Y$ » and is situated in the Alpha Quadrant

**Example 1 – reformulated version annotated with the argument form**

*The suspect* ($a$) *was driving fast* ($X$), *because the suspect* ($a$) *left a long trace of rubber on the road* ($Y$)
Figure 6. Decision tree for determining the argument form
**Step 4 – Determine the argument substance**

Apart from by its ‘argument form’, each type of argument distinguished within the theoretical framework of the PTA is characterized by its ‘argument substance’ (Wagemans 2016, pp. 7-8). This notion is defined as the specific combination of types of statements the argument instantiates. The labelling of the type of statement is done in accordance with a widely used tripartite typology of statements developed within debate theory that consists of statements of fact (F), statements of value (V), and statements of policy (P).

- a statement of fact (F) is defined as a description of a particular state of affairs that is or can be empirically observed in reality or that is or can be imagined to exist. In order for the analyst to distinguish them from statements of value, it may be helpful to consider the following subtypes and examples:
  - empirical statements, such as ‘The suspect left a long trace of rubber on the road’.
  - existential statements, such as ‘God exists’
  - predictions, such as ‘The economy will grow’
- a statement of value (V) is defined as an evaluative judgment about a particular entity based on a subjective selection and weighing of assessment criteria. In order for the analyst to distinguish them from statements of fact, it may be helpful to consider the following subtypes and examples:
  - aesthetic judgments, such as ‘The Corrections is a great novel’
  - moral or ethical judgments, such as ‘Circumcision is reprehensible’
  - legal judgments, such as ‘Unauthorized copying is not theft’
  - pragmatic judgments, such as ‘Our plan for reducing CO2-emission is feasible’
  - logical judgments, such as ‘This proposition is true’
  - hedonistic judgments, such as ‘Paragliding is fun’
- a statement of policy (P), which is defined as a directive statement that expresses an advice, an incitement, or an imperative. The analyst may recognize statements of policy because of the presence of the term ‘should’ in combination with a verb expressing a particular action. Examples are:
  - advice, such as ‘Children should not sleep with artificial lighting’
  - incitements, such as ‘You should go to the gym’
  - imperatives, such as ‘Go to your room’
  - proposals, such as ‘Let’s make the study of rhetoric great again’

By labelling both the conclusion and the premise of the argument in this way, the argument substance can be determined as one of the nine possible combinations of types of statements (FF, VF, PF, FV, VV, PV, FP, VP, PP).

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The argument _The suspect was driving fast, because the suspect left a long trace of rubber on the road_ combines a statement of fact (F) in the conclusion with another statement of fact (F) in the premise.

<table>
<thead>
<tr>
<th>Determination of the argument substance</th>
<th>statement</th>
<th>type of statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>conclusion</td>
<td>the suspect was driving fast</td>
<td>statement of fact (F)</td>
</tr>
<tr>
<td>premise</td>
<td>the suspect left a long trace of rubber on the road</td>
<td>statement of fact (F)</td>
</tr>
</tbody>
</table>

**Example 1 – reformulated version annotated with the argument substance**

_The suspect was driving fast (F), because the suspect left a long trace of rubber on the road (F)_
Step 5 – Provide the systematic name of the argument

The systematic name of an argument is a symbolic representation of the results of Step 3 and 4 of this procedure and thus contains information regarding the argument form and the argument substance. It consists of:
- the prefix “1” or “2”, indicating a first-order or a second-order argument
- the infix “pre” or “sub”, indicating a predicate or subject argument
- the suffix “FF”, “VF”, etc., indicating the types of statements instantiated by the argument

| The suspect was driving fast, because the suspect left a long trace of rubber on the road | is a first-order predicate argument that combines a statement of fact with another statement of fact. Its systematic name is 1 pre FF.
| Example 1 – reformulated version |
| The suspect was driving fast, because the suspect left a long trace of rubber on the road |
| Example 1 – reformulated version annotated with complete argument type information |
| The suspect (a) was driving fast (X) (F), because the suspect (a) left a long trace of rubber on the road (Y) (F) (1 pre FF) |

4. Deriving the lever on different levels of abstraction

After having presented how the analyst can identify the type of argument by making use of the Argument Type Identification Procedure (ATIP), I turn now explaining how they can subsequently derive the argument lever from such identification. The lever of an argument is an expression of its underlying mechanism, which explains how a statement can establish or increase the acceptability of another statement. As such, the word ‘lever’ is taken from the same source domain as the word ‘fulcrum’. While the fulcrum is defined as the term – i.e., the subject or predicate – that the conclusion and the premise of the argument have in common, the lever is defined as the relationship between the non-common terms (Wagemans 2019, p. 61).

As explained in the introduction, the procedural approach to argument type identification differs from the comparative approach in that it does not work with a predefined ‘connecting premise’ or ‘warrant’ that the analyst has to add to the discourse in case it is missing. Instead, it works with a flexible ‘lever’ that can be formulated on different levels of abstraction depending on the availability for the analyst of information about (1) the characteristics of the argument as obtained during the application of the ATIP and (2) the discursive context in which the argument has been put forward. To illustrate this point, I now provide progressively more concrete formulations of the lever of an example of natural argument, namely the famous opening statement of Aristotle’s Metaphysica.5

Example 2
All human beings by nature desire to know. A sign of this is our liking for the senses; for even apart from their usefulness we like them for themselves – especially the sense of sight, since we choose seeing above practically all the others, not only as an aid to action, but also when we have no intention of acting. The reason is that sight, more than any of the other senses, gives us knowledge of things and clarifies many differences among them. (Aristotle, Metaphysica 980a21-27, translation Irwin and Fine, 1995)

5 For more example analyses, please see www.periodic-table-of-arguments.org.
If the analyst only uses the information about the argument form, the formulation of the lever will be a fairly abstract one. Following the ATIP, the argument in the beginning of this text can be reconstructed as *All human beings by nature desire to know, because all human beings have a liking for the senses*. This argument has the form ‘*a* is *X*, because *a* is *Y*’ and can therefore be identified as a first-order predicate argument. The lever, being defined as the relationship between the non-common terms, can then be formulated as the relationship between *X* and *Y*, i.e., between *by nature desire to know* and *have a liking for the senses*. The abstract levers for the different argument forms are specified in Table 3.

<table>
<thead>
<tr>
<th>argument form</th>
<th>fulcrum</th>
<th>abstract lever</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>a</em> is <em>X</em>, because <em>a</em> is <em>Y</em></td>
<td><em>a</em></td>
<td><em>Y R X</em></td>
</tr>
<tr>
<td><em>a</em> is <em>X</em>, because <em>b</em> is <em>X</em></td>
<td><em>X</em></td>
<td><em>a R b</em></td>
</tr>
<tr>
<td><em>q</em> is <em>T</em>, because <em>r</em> is <em>T</em></td>
<td><em>T</em></td>
<td><em>q R r</em></td>
</tr>
<tr>
<td><em>q</em> is <em>T</em>, because <em>q</em> is <em>Z</em></td>
<td><em>q</em></td>
<td><em>Z R T</em></td>
</tr>
</tbody>
</table>

Table 3. Abstract levers based on information about the argument form

To provide a more concrete formulation of the lever, the analyst can also take into account the argument substance. Following the ATIP, the argument can be identified as an FF argument. This means that the relationship between the predicates can be seen as a relationship between two different factual properties attributed to the same subject. At this point, the analyst can use the various ‘1 pre FF’ arguments already identified in the PTA as a heuristic. As pictured in Figure 7, a visualization of the Alpha Quadrant hosting all the first-order predicate arguments, the ‘1 pre FF’ arguments have levers formulated as ‘*Y* is a sign for *X*’, ‘*Y* is a cause of *X*’, ‘*Y* is an effect of *X*’, and ‘*Y* is correlated with *X*’.

![Figure 7. The Alpha Quadrant of the Periodic Table of Arguments – Version 2.5](image)

As mentioned above, to justify the choice of concrete lever that fits the argument under scrutiny, the analyst can also refer to the discursive context in which the argument has been put forward. In this case, Aristotle explicitly uses the term ‘sign’ to qualify the argumentative relationship between the conclusion and premise, thereby giving the analyst an extra reason to formulate the lever as *have a liking for the senses* is a sign for *by nature desire to know*.

Once the lever has been formulated, its solidity can be evaluated. Such evaluation can reflect both the informal logic tradition of questioning the relevance and sufficiency of an
argument and the dialectical tradition of asking critical questions, some of which pertain to the connection between the premise and the conclusion of the argument. In this case, to determine the solidity of the lever, the evaluator should examine the extent to which \textit{have a liking for the senses} is a sign for by nature desire to know. Although the outcome of the evaluation is a subjective judgement of the evaluator, by following the method just explained such judgment pertains to an expression of the underlying mechanism of the argument that is systematically derived from an identification of its type.

5. Conclusion

The argument categorization framework of the Periodic Table of Arguments (PTA) takes an argument to consist of only two statements, one functioning as the premise and the other as the conclusion, which means that it excludes from its conceptualization of argument the element traditionally called the ‘connecting premise’ or ‘missing premise’. Given that this element is one of the usual objects of evaluation of an argument, I addressed in this paper the question of how the PTA can be used for evaluative purposes by explaining how the analyst can derive the so-called ‘lever’ of an argument from an identification of its type.

The method, so I believe, has some advantages compared to traditional ways of obtaining an expression of the connection between the premise and conclusion of an argument. The first advantage concerns its procedural nature. Different from comparative methods, which identify connecting premises based on a subjective comparison with a list of predefined argument schemes, the lever is derived from a systematic analysis of the characteristics of the argument as expressed in the original text. Following this procedural method not only makes the analysis more transparent and robust but also prevents the analyst from reconstructing the text based on preconceived ideas of what an argument should consist of and therefore from running the risk of providing a biased evaluation of how the premise establishes or increases the acceptability of the conclusion.

A second advantage of deriving the lever from the characteristics of the argument rather than adding a predefined missing premise is that such a lever can be formulated on different levels of concreteness, depending on the information the analyst has available. Based on the argument form, the lever can be formulated more abstractly, for instance, as a relationship between predicates. Bringing in additional information about the argument substance enables the analyst to formulate the lever, for example, as a relationship between factual properties. If there is textual evidence about how the arguer expresses the relationship between the non-common terms, like in the case of the example argument taken from Aristotle’s \textit{Metaphysica} discussed above, the analyst can use the same keyword as the arguer to formulate the lever of the argument. I think such cautiousness in providing a concrete formulation of the lever would again prevent the analyst from engaging in the hermeneutical activity of ‘hineininterpretieren’.

Thirdly and finally, the development of a procedural instead of a comparative method for argument identification and evaluation prepares the ground for a further formalization of these activities, which is a necessary step for the subsequent development of computational applications. As said above, the outcome of an assessment of the solidity of the lever of an argument is a subjective judgment of the evaluator. And I doubt whether such judgment can ever be given by an AI engine, if this would be desirable at all. But I also think that being aware of the importance of humans having the last word about what they find acceptable does not have to turn us into techno-repellent Luddites. On the contrary, it may well be the case that

\footnote{6 See de Jong (2019) for a systematic description of the relationship between critical questions and argument schemes.}

\footnote{7 A formal representation of the results of applying the ATIP to natural argumentative discourse that is suitable for such computational applications can be found in Gobbo, Benini and Wagemans (2019).}
sufficiently formalized argumentation theoretical insights are crucial for developing ‘explainable AI’ (XAI) engines that can assist humans in performing vital tasks such as making decisions based on facts and reasonable arguments.

The research presented in this paper is a first step in examining the connection between the systematic names used in the theoretical framework of the PTA and the traditional names of the types of arguments used in existing dialectical and rhetorical classifications of argument. In several of the cases analyzed so far, the keyword used in the formulation of the lever is also to be found in the traditional name. If the lever contains, for instance, the term ‘sign’ in order to substantiate the relationship between the predicates, the corresponding traditional name of the argument is ‘argument from sign’. Extensive research into these correspondences, I believe, would greatly benefit the further systematization of argument description and classification, which is something that motivated the development of the PTA in the first place.

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References


