Identifying linked and convergent argument structures: a problem unsolved

Shiyang Yu & Frank Zenker

Abstract: To analyze the structure of a natural language argument, the *linked vs convergent* structure distinction rightly counts as crucial, whereas the (related) *serial* structure is less important. In applying this distinction to arguments-as-products, argumentation scholars test for variations of argument strength under premises revision, by assessing whether an argument's premises are individually or collectively relevant to the conclusion, and by assessing the degree of support. Both criteria presuppose that evaluating an argument's strength is methodologically prior to analyzing its structure. Here we problematize that, since state-of-the-art methods for identifying linked or convergent argument structures rely on semantic or pragmatic information, they fail to deliver a genuinely structural analysis. Given that 'argument structure' is a concept of analysis, after all, a structural analysis would precede evaluating the argument's strength. Both criteria thus "put the cart before the horse." Moreover, while a dialectical approach to argument structure allegedly differs from a logical approach in that the object of analysis is a dynamic argument-as-process, rather than a static argument-as-product, we argue that a dialectical approach likewise targets a static argument-as-product.

1. Introduction

As the three central research questions for the study of argument structure, Snoeck Henkemans (2001, 102) identifies the following: (1) *Definition*: how to define and typify argument structures? (2) *Analysis*: how to identify the structure of a specific argument? (3) *Intellectual history*: how has the concept 'argument structure' developed? Given that a reasoned view on (2) must ground in a reasoned view on (1), the main issue thus is the definition of argument structure. Other than providing a brief review of scholarly approaches (Sect. 2), here we mostly neglect (3).

The concept of 'argument structure' is complementary to the concept of 'argument scheme'. Whereas an argument structure "characterizes the 'external organization' of the argumentation" (van Eemeren *et al*., 2014, 21), an argument scheme "defines […] how the 'internal organization' of the argumentation is to be judged" (*ibid*.,19). Argumentation scholars who theorize such structures on a *logical* approach tend to highlight the goal of "determin[ing] whether the premises constitute good reasons for accepting the conclusion, good in the sense of transferring the acceptability of the [accepted] premises […] to the conclusion" (Freeman, 2011, 109). Here, the focus is on the structure of the *argument-as-product*, itself a simplified version of a dialectical arguing process. By contrast, scholars who pursue a *dialectical* approach highlight the functions of the reasoning or argumentation process (Snoeck Henkemans, 2001, 101). Here, "the focus of interest concerns how well a critical discussion has come to a reasoned resolution of some disputed question" (Freeman, 2011, 109).

Argumentation scholars broadly seek "to provide theoretical instruments for analyzing, evaluating and producing argumentative discourse in an adequate way" (van Eemeren, 2018, 5). To this end, the main theoretical approaches use slightly different labels for an argument structure (Fig. 1). Informal logicians, for instance, distinguish *serial*, *linked*, and *convergent* structures, whereas pragma-dialecticians speak of *subordinative*, *coordinative*, and *multiple structures*. These terms, however, fail to entail a substantial difference (Snoeck Henkemans, 2001). We adopt the former terminology.
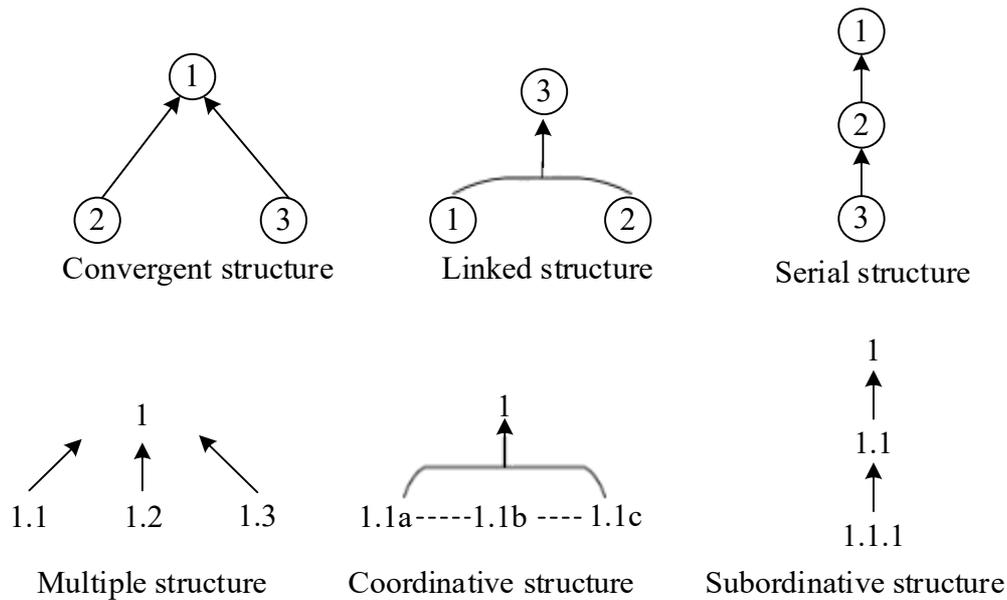
Fig. 1 Three argument structures, with the top node representing the conclusion, and the other nodes the premises

The central distinction is that between a *linked* and a *convergent* structure. Multiple premises of a convergent structure (aka convergent premises) are interpreted logically as alternative *lines of support*, or dialectically as alternative *lines of defense*, for the standpoint. In a linked structure, by contrast, multiple premises provide only a single line of support/defense. In a *serial* structure, finally, a single premise provides a single line of support/defense for a conclusion, itself providing another line of defense/support for yet another conclusion. The serial structure thus arises from a hierarchical arrangement of single lines of defense/support, involving more than one conclusions.

Virtually all structural analyses recur to the mutual (in-)dependence or (ir-)relevance of the premises. Roughly, if premises are independent or irrelevant to other premises, then the argument instantiates a convergent structure, otherwise a linked structure. Our main claim is that, since judgements of premise-dependence or -relevance inform a structural analysis, this is what creates the very problem of distinguishing linked from convergent structures in the first place, because these judgments depend on evaluating the argument's comparative ability to transfer acceptability from the premises to the conclusion.

Also known as *argument strength*, the transfer is modelled as a function of what scholars variously call the argument's *justificatory force*, the *weight* of the premises, or the *degree of support* lent to the conclusion. Since argument structure is thus identified by way of evaluating premise (in-)dependence/relevance, one cannot avoid analyzing the *contents* of premises and conclusion, and how these contents relate to each other, and to additional, possibly contravening information. Alas, a structural analysis is widely thought to occur *before* evaluating argument strength: argument analysis is *preparatory* to argument evaluation (Freeman, 2011, 141; van Eemeren & Grootendorst, 1992, 95f.). When properly understood, however, analysts in fact recur (implicitly) to *semantic* and *pragmatic* information in order to settle a *structural* question, and so engage in argument evaluation.

This, we argue, defines 'argument structure' in the wrong way. At any rate, it challenges the idea that 'argument structure' is merely an analytic, rather than (also) an evaluative concept. We start by introducing a logical and dynamic dialectical approach to argument structure (Sect. 2). Since the dynamics in the dialectical approach is non-obvious, we submit that a dialectical approach in fact amounts to yet another static approach (Sect. 3). Next, we turn to two approaches to distinguish linked from convergent structures based on premise-dependence and -relevance (Sect. 4). Since both approaches test for variations of argument strength under premise revision, we argue that this has things backwards (Sect. 5). Our conclusions are in Sect. 6.

2. Logical and dialectical approaches to argumentation structure

2.1 The logical approach

A logical approach generally pays attention "only to the structur[al] aspects of argument structure as they manifest themselves in the product of the reasoning process" (Snoeck Henkemans, 2001, 101). Following Beardsley's (1950) distinction between *convergent*, *divergent*, and *serial* structure, the relevant terminology nevertheless cites the term 'support', thus invoking not only a semantic interpretation (i.e., what premises and conclusion *mean*), but also an evaluative process. A *convergent* argument Beardsley defines as one where "several independent reasons support the same conclusion," while

in a *divergent* argument "the same reason supports several conclusions," whereas a *serial* argument "contains a statement that is both a conclusion and a reason for a further conclusion" (Beardsley, 1950, 19). What will prove crucial here is that support for the same conclusion thus arises from reasons, or premises (Adler, 2008), that are in a relevant sense *independent*.

The first to distinguish a *convergent* from a *linked* structure seems to have been Thomas (1997 [[1]1973]) (Snoeck Henkemans, 2001, 108). For the linked structure, Thomas observes that reasons provide *inter-dependent* support to a conclusion. "When a step of reasoning involves the logical combination of two or more reasons, they are diagrammed as *linked*." (Thomas, 1997, 50). By contrast, "[w]hen two or more reasons do not support a conclusion in a united or combined way"—by which Thomas means that "each reason supports the conclusion completely [sic] separately and independently of the other"—then "the reasoning is *convergent*" (*ibid*., 52; *his italics*).

Though not offering any dedicated terms, Copi & Cohen (1990) similarly distinguish a *convergent* from a *linked* structure such that, in the former, "each of the […] premises supports the conclusion *independently*. Each supplies some warrant for accepting the conclusion and would do so even in the absence of the other premiss" (*ibid*., 19). In a linked argument, by contrast, the "premisses must work together to support their conclusion" (*ibid*., 20), such that premises "work cooperatively" (*ibid*.).

Again avoiding dedicated terms, Pinto & Blair (1993) likewise distinguish "between a 'group' of premises that together form one inference and 'independent' groups of premises which can be seen as parallel inferences to arrive at the same conclusion" (Snoeck Henkemans, 2001, 112). 'Dependence' here expresses that "the premises work in combination to support the conclusion," and 'independence' expresses that "the premises of each group are able to provide their support without any help from premises in any other group make them independent of each other" (Pinto & Blair, 1993, 77; see Snoeck Henkemans, 2001, 112).

Adopting this idea, Groarke, Tindale & Fisher (1997) improve on this formulation: "[l]inked premises work together. Taken independently, they do not support the argument's conclusion. Convergent premises do not require each other, for they support

the conclusion *independently* of the argument's other premises" (Groarke, Tindale & Fisher, 1997, 35; *italics added*; see Snoeck Henkemans, 2001, 114).

Other scholars distinguish argument structures using the concept 'relevance' as supplementary to 'dependence'. In discussing tree-diagrams as a means of mapping an argument's logical structure, for instance, Johnson & Blair (1994) observe for linked arguments that "two or more premises are *relevant* in combination," whereas in convergent arguments, there are "two or more distinct, *independent* grounds for a conclusion" (*ibid.*, 36-38; *italics added*). Independence and irrelevance thus associate with a *convergent* structure, while dependence and relevance associate with a *linked* structure.

Like Johnson & Blair (1994), also Govier's (2010) version of this distinction places relevance next to independence:

"*Linked* premises can support the conclusion in the argument only when they are taken together; no single premise will give any support to the conclusion without the others. […] When the support is of the *convergent* type, each premise states a separate reason that the arguer thinks is *relevant* to the conclusion. In these cases, premises are not linked and are not *interdependent* [i.e., independent] in the sense that each one could support the conclusion without the others." (Govier, 2010, 37f.; *italics added*)

In sum, when distinguishing a linked from a convergent argument structure—with the concept of relevance added, or not—the (in-)dependence of the premises is central. We return to this in Sect. 4.1, there explaining the status of dependence, and argue for its impotency as a useful criterion in Sect. 5.1. First, we turn to the dialectical approach.

2.2 The dialectical approach

While the logical approach to argument structure focuses on the argument-as-product (as an abstract inferential object where reasons support a conclusion), the dialectical approach connects the concept of 'argument structure' with that of a 'dialectical

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situation'. Here, it "depends on the antagonist's doubts and the way the arguer [read: the proponent] attempts to deal with these doubts what the resulting structure of [her] argument will be" (Snoeck Henkemans, 2001, 119; see van Eemeren & Grootendorst, 1984; 1992; 2004). Specifically, coordinative and multiple argumentation are treated "as resulting from *different types of defensive moves* aimed at removing different forms of criticism" (Snoeck Henkemans, 2001, 121; *italics added*; see Snoeck Henkemans, 1992).

Coordinative argumentation is a response to a *criticism of sufficiency* and can be neutralized in one of two ways. In a direct or *cumulative* defense, the protagonist adds at least one new argument (or reason); in an indirect or *complementary* defense, the protagonist refutes the antagonist's counter-argument. In both cases, old and new arguments must be somehow combined, "because the arguer can only convince the opponent of the acceptability of the standpoint if [s]he succeeds in removing the opponent's doubt or criticism regarding the sufficiency of the [entire] argumentation" (*ibid.*, 121).

In *multiple* argumentation, by contrast, "the only connection between the arguments is that they are all advanced as a [separate] defence of the same standpoint" (*ibid.*, 121). As before, there are two ways of offering a defense. The protagonist may "*withdraw* his [original] argument and undertake a new attempt to defend the standpoint" (*ibid.*, 121f.); or "in anticipation of a possible non-acceptance of his argument, the protagonist may *advance a new argument* […] motivated by the (potential) failure of a previous attempt" (*ibid.*, 122; italics added).

Also Freeman (1991) identifies argument structure with respect to the dialectical situation. In a *convergent* structure, "two or more premises are each independently relevant to the conclusion," and each premise is "given to answer the question—Can you give me an additional reason?" (*ibid.*, 94). In a *linked* structure, by contrast, "two (or more) premises must be taken together or are intended to be taken together to see why we have one relevant reason for the conclusion," such that "at least one of [the] linked premises [must be] offered to answer the question—Why is that (the remaining premise or premises) relevant?" (*ibid.*, 94). This serves to distinguish two types of

premise combination, depending on the question to which the answer responds: "premises involving relevance combination are linked, while premises involving modal[1] combination are convergent" (Freeman, 2011, viii).

In sum, the logical approach targets the argument-as-product resulting from a reasoning process. Different structures are determined via the support-relation among premises and conclusion, i.e., whether reasons support the conclusion individually or jointly. The dialectical approach, by contrast, targets the argumentative process and structures are determined as per whether reasons resolve the antagonist's doubts jointly or separately.

3. Premise dynamics

We saw that a logical approach focuses on structures that manifest themselves in a product of reasoning, whereas a dialectical approach focuses on structures that arise in the process of defending a standpoint against an opponent's doubt or criticism. The term 'argumentation structure' thus refers either to the specific arrangement of conclusion-supporting reasons in a *static* product, or to the constellation of defensive moves in the *dynamic* process unfolding under an opponent's critical pressure. In the pragma-dialectical theory, for instance, the purpose of identifying argument structure is to elaborate how dialectical moves contribute to resolving a difference of opinion.

While the distinction between *supporting a conclusion* and *defending a standpoint*

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[1] In agreement with Snoeck Henkemans (1992), Freeman (2011, 120) submits that "the modality qualifies the standpoint" by "express[ing] […] different levels of commitment to the proposition advanced by the standpoint." For instance, 'Socrates is *certainly* guilty of corrupting the youth' and 'Socrates is *possibly* guilty of corrupting the youth' both "express the same proposition, but the standpoints taken with respect to the proposition are different in each case, since each involves a different degree of commitment to the proposition" (Freeman, 2011, 120; see Snoeck Henkemans, 1992, 110). With a modal combination, then, "[e]ach premise may give some reason for the conclusion, but their combined weight constitutes a stronger case" (Freeman, 2011, vii).

merely reflects a preferred theoretical perspective on natural language argument, the distinction between *argument-as-product* (static) and *argumentation-as-process* (dynamic) is substantial, because extracting only the premises and the conclusion—as is typical for an argument-as-product—entails neglecting, indeed deleting, material that is constitutive of the argumentation-as-process.

Yet, the dialectical approach to argument structure, we submit, fails to *accomplish* the task of representing the process of argumentation. To explain, consider the instance A-1, by Thomas (1986), as cited in Freeman (2011, viii). On the dialectical approach, an analyst would identify A-1 as a *convergent* structure, because the proponent defends the standpoint against doubt or criticism using three independent reasons, R1-R3.

A-1 Example of convergent argumentation (Freeman, 2011, viii)

[R1] His swimming suit is wet.

[R2] His hair is plastered down.

[R3] He is wearing swimming goggles. Therefore

[Conclusion] He's been swimming.

What kind of dialectical situation might be associated to A-1? As per Freeman's method of reconstructing the dialectical situation, in order to connect any two convergent premises, one may imagine the antagonist asking intermediately: "Can you give me an additional reason?" We can hence transform A-1 into the dialogue D-1 between, say, Lucy and Tony.

D-1 Examples A-1 transformed into a dialogue

Tony: "You see, he's been swimming [Conclusion], because, his swimming suit is wet [R1]."

Lucy: "Can you give me another reason?"

Tony: "His hair is plastered down [R2]."

Lucy: "Well, can you give me another reason?"

Tony: "All right, he is wearing swimming goggles [R3]."

In D-1, Tony initially forwards only R1, whereas R2 and R3 arise in response to the critical pressure by Lucy. Would the dialogue D-1 unfold as described, then under normal conditions two assumptions hold. First, Lucy was insufficiently convinced by R1, and receiving R2 did not change this. Otherwise, why would she ask for additional reasons? Second, compared to R2, R1 has a special status because it is Tony's original premise, to which Lucy reacted critically. Speculatively, Tony might have believed that R1 suffices to convince Lucy, explaining why he avoided offering additional reasons *without* critical pressure. Alternatively, Tony may have purposefully offered a weak reason first. In either case, for Tony, R1 seems to be a distinct reason from both R2 and R3.

Neither assumption, however, can be justified readily, as any such transformation requires information that is *absent* from A-1. But can one nevertheless readily identify the resulting dialogue's structure? It turns out, one rather cannot, or so D-2 shows, where R3 is withdrawn under critical pressure.

D-2 A dialogue where reason R3 is withdrawn

(1) Tony: "You see, he's been swimming [conclusion], because his swimming suit is wet [R1], and swimming makes one's suit wet [R2]. Moreover, his hair is plastered down [R3]."

(2) Lucy: "But, actually, I saw his hair was dry."

(3) Tony: "Well… all right, my guess [R3 withdrawn]."

Given Tony's original utterance in (1), R1 and R2 as sub-structures instantiate a *linked* structure, which, like R3, feature separate premises, whereas R1, R2, and R3 together instantiate a *convergent* structure. So, if R3 is withdrawn in (3), the structure constituted by R1 and R2 turns out to be *linked*. So, is the structure in D-2 linked or convergent? The best answer, apparently, is that the structure *changes* from a convergent to a linked structure.

Of course, besides simply withdrawing reasons, arguers can also revise reasons.

To our best knowledge of the literature, the dialectical approach to argument structure has so far failed to discuss such changes, leaving it unclear whether a dialectical analysis can adequately deal with premises dynamics. Far from denying the difference between 'supporting a conclusion' and 'defending a standpoint against doubt or criticism', then, we hold that a dialectical approach to argument structure is virtually indistinguishable from a logical approach, as both target at static argument-as-product.

We now turn to ways of testing whether arguments-as-products feature linked or convergent structures.

4. Testing for linked and convergent structures

4.1 Support-based tests

Walton (1996, 119f.) lists five tests (T1-T5) to distinguish a linked from a convergent structure. A positive test-result generally indicates that the structure is *linked*, while a negative test-result indicates that it is *convergent*. In each case, the test-criterion is the effect upon the support-relation when a premise is considered false or is suspended (as neither known to be true nor false), in which case the conclusion receives either insufficient support, or no support at all. T1-T4 are binary tests, while T5 reports the test-result in comparative, yet vague terms (ordinal measurement level). Except for T-2, which Walton develops in analogy to T-1, T-3 and T-4, the other four tests draw on previous literature.

T1 *Falsity/no support*

If one premise is false, then the conclusion no longer receives any support.

T2 *Falsity/insufficient support*

If one premise is false, then the conclusion receives insufficient support.

T3 *Suspension/no support*

If one premise is suspended (not proved, not known to be true), then the conclusion receives no support.

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T4 *Suspension/insufficient support*

If one premise is suspended (not proved, not known to be true), then the conclusion receives insufficient support.

T5 *Degree of support*: If the joint strength of the argumentation is much greater than if each premise is considered separately, then the argument has a linked structure.

T1, called the Copi-Cohen test (Copi & Cohen, 1990, 20), shall not only indicate "whether the premises 'work cooperatively' or 'independently'" (Walton, 1996, 109), but also "whether each [premise] is absolutely needed for the other [premise(s)] to provide any support at all to the conclusion" (*ibid*., 111). The same holds for T2. Further, when weakening the antecedent-condition—from a premise being *false* to being *suspended*—one obtains T3, called the Freeman test (Freeman, 1988, 178). T3 tests for non-zero support by asking whether, "if we suspend the one premise, does the other give *any reason at all* to support the conclusion?" (Walton, 1996, 113; *italics added*). T4 does the same for non-zero but insufficient support (van Eemeren & Grootendorst, 1984, 91; Windes & Hastings, 1965, 216). Specifically, T4 tests for insufficient support that is typical for multiple argumentation, where among "a series of separate and individual arguments' for a conclusion […] it does not matter [with respect to supporting the conclusion] *which* [argument] is chosen" (Walton, 1996, 114f.; see van Eemeren & Grootendorst, 1984, 91).

T1-T4 are *binary* tests (Walton, 1996, 121), whereas T5 presents an extension of T1-T4 to a *comparative* notion of support. Inspired by Thomas (1981, 52) and Acock (1985, 83)—hence called the "Thomas-Acock test"—T5 tests "how well the conclusion was supported before a premise was removed versus how well [the conclusion] is supported once the premise is taken away" (Walton, 1996, 121). Thomas' and Acock's tests, however, test for *distinct* state of affairs. For Thomas, "[t]he test for a linked argument is: if one premise is taken away, the conclusion is more weakly supported

than it was when that premise was in the argument" (Walton, 1996, 125). According to Thomas' test, then, the argument '(i) his swimming suit is wet; (ii) his hair is plastered down; therefore, he's been swimming' instantiates a *linked* structure. After all, if (i) or (ii) are suspended, then the conclusion is less supported than if both premises are present. This result is counter-intuitive as scholars would normally consider the argument to instantiate a convergent structure.

According to Acock's test, by contrast, it holds for a linked argument that "the sum of the amount of support given independently [by the premises, to the conclusion] is less than the amount of support [the premises] give to the conclusion when taken together" (Acock, 1985, 83; see Walton, 1996, 125). This means that Acock's test compares the *joint* support that the entire premise-set lends to the conclusion to the *summed* support that each premise lends individually. Acock's test thus differs from Thomas' in that Acock's test must (somehow) determine the support that each premise lends individually *and form the sum*, and only then compare this sum to the joint support lent by the entire premise-set. By contrast, Thomas's test determines the joint support, and then establishes whether suspending a premise results in reduced support. Yet, this test never determines, nor does it sum, the support each premise lends individually.

Yanal (1988, 42; Walton, 1996, 127) refined Thomas's test by altering the change in support from 'is greater/less' to 'is *much* greater/less', yielding T5. As Walton (1996, 166) observes, what T5 "literally says is that, when we remove the premise (or component argument) in question, the level of support for the conclusion drops considerably," which entails that "the argument is no longer strong enough to meet the [contextually determined] level of burden of proof […] to make the conclusion acceptable. So construed, T5 amounts to the same finding as [T3]" (Walton, 1996, 166).

Properly understood, however, T5 does *not* require that support changes from sufficient to insufficient. T5 merely requires that, in a linked structure, the degree of joint support is much greater than that if the premises are considered individually. Thus, it remains possible that, even after a large increase (or decrease) in strength, the argument nevertheless cannot meet the sufficiency (insufficiency) requirement. Hence, T3 and T5 are distinct tests, with different test-criteria.

In sum, all tests rely on the variation in strength/support to address the dependency of premises. This makes dependency inherent in the concept 'argument structure'. Yet, we submit, defining dependency based on strength variation need not always succeed. As we will explain in Sect. 5.1, T1-T5 thus fail to be *absolute* tests. First, we turn to yet another way of distinguishing linked from convergent structure, which we criticize in Sect. 5.2.

4.2 Relevance-based test

As we saw in Sect. 2, besides dependency, another factor inherent in the concept of 'argument structure' is *relevance*. Freeman (2011) holds that an argument instantiates a convergent structure if "two or more premises are each *independently relevant* to the conclusion," which means that "[e]ach gives a separate piece of evidence for the conclusion" (Freeman, 2011, 94; *italics added*). Freeman considers premises involving *relevance* combinations as linked, such that "premises which taken individually do not constitute even relevant reasons for a conclusion [may,] when taken in combination [, …] constitute one obviously relevant reason" (*ibid*., vii). By contrast, premises involving *modal* combinations are convergent such that "each premise may give some reason for the conclusion, but their combined weight [read: support] constitutes a stronger case" (*ibid*., viii).

The relevance relation between any two statements, *P* and *Q*, Freeman submits, is best thought of "as a ternary relation between *P*, *Q*, and a set of inference rules *I*" (Freeman, 2011, 130; see Freeman, 1992). Here, *I* may contain formal deductive or inductive rules, as well as material inference rules (e.g., Toulmin's warrants). For instance, 'Harry was born in Bermuda' is relevant to 'Harry is a British subject', because *I* contains the rule 'from *x* is born in Bermuda, infer that *x* is a British subject' (*ibid*., 131f.). This consideration is based on Peirce's (1955, 130) *inference habit* that "convey[s] us from one judgment to another" (Freeman, 2011, 130). It is in virtue of an inference habit, then, that one can "perceive or intuit relevance" (*ibid*.).

This ternary-relation of relevance Freeman defines as follows:

"A statement P is relevant to a statement Q if there is some inference rule in the canonical set C licensing the move from P to Q. Similarly, a set of statements $P_1, P_2, \ldots, P_n$ is relevant to a statement Q if there is some n-premised inference rule in C licensing the inferential move from $P_1, P_2, \ldots, P_n$ to Q" (Freeman, 2011, 131).

Since this makes relevance inherent in the concept 'argument structure', Freeman's method appears competitive to support-based tests. Yet, as we will show in Sect. 5.2, Freeman's test must likewise be grounded in support/strength, and so is problematic.

5. Problems

5.1 Evaluating T1-T5

Prima facie, an argument's premises being dependent means that the premises support the conclusion jointly, or in a combined way (Thomas, 1986, 58), i.e., the premises "work together to support conclusion" (Copi & Cohen, 1990, 20). This interpretation, however, does not yield a well-specified criterion to distinguish a linked from a convergent structure. For the linked structure, after all, the intended interpretation of 'working together' presumably is that the premises support the conclusion *as much as possible*. Yet, this is also the case if one adds a premise to a convergent structure. The expanded premise-set here lends "more support to the conclusion collectively than each [premise] would individually" (Walton, 1996, 111f.), because "convergent premises together [make] a stronger case for the conclusion than either [premise] by itself" (Freeman, 2011, ix). The premises thus work together in a convergent *and* in a linked structure.

A relevant difference between both structures might arise if the premises in a linked structure work together *necessarily*, whereas this need not hold for a convergent structure. A straightforward way of specifying necessity cites, firstly, the *sufficiency* of support: if the premises of a linked structure support the conclusion independently, then each premise lends *insufficient* support to the conclusion. In a convergent structure, by contrast, each premise *may*, but it need not, support the conclusion sufficiently. This

could explain why premises must necessarily work together to generate sufficient support. This way of understanding 'necessity' refers to T2 and T4. By contrast, T1 and T3 interpret 'necessity' with respect to whether the conclusion can render any support or none. Similarly, if support is largely diminished, then the structure should be judged otherwise, as per T5.

Thus, all tests are based on the variation between two states of support. The first state amounts to all premises jointly supporting the conclusion. The second state amounts to only some premises (namely those not suspended or considered false) supporting the conclusion. To see how this plays out in an example, here using a state of (in)sufficient support, consider the arguments A-2 (convergent) and A-3 (linked):

A-2 A convergent argument (Freeman, 2011, viii)

[R1] His swimming suit is wet.

[R2] His hair is plastered down. Therefore

[C] He's been swimming.

A-3 A linked argument

[R1] His swimming suit is wet.

[R1-C] Swimming wets one's suit. Therefore

[C] He's been swimming.

On the assumption that A-3 instantiates a *linked* structure, both of its premises are individually necessary, and jointly provide sufficient support to the conclusion. In this case, if R1-C were suspended, then C would (implausibly) be left without *any* support from R1. By contrast, on the assumption that A-2 instantiates a *convergent* structure, each of R1 and R2 can support C individually. However, both assumptions together result in a contradiction: R1 by itself can, but at the same time cannot, support C.

One way of treating this contradiction is to stipulate that, before judging the sufficiency of support in a convergent structure, one must make all implicit premises explicit. This would explain that, in A-2, C is not *independently* supported by R1, yet

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is supported once the implicit premise/inference rule R1-C is added, as is the case in A-3. Although this stipulation eliminates the contradiction, we merely incur a new problem: once one treats the linked structure in the same way, namely such that a reconstruction is allowed (even required) before judging the dependency relation, R1 and R1-C would cease to be dependent. For instance, when reconstructing the argument 'R1 therefore C', one may supply R1-C as an implicit premise. Similarly, without R1, after a reconstruction, R1-C alone can support the conclusion. The linked argumentation 'R1, R1-C, so C' would thus change into a convergent argument, because its premises can individually support the conclusion.

There is a more serious problem. Both when maintaining that R1 *or* R2 *by itself* or R1 *and* R1-C *together* support the conclusion sufficiently, one must have presupposed that the support lent by the premise(s) to the conclusion is sufficient. This presupposition requires critically considering, firstly, the semantic relation between premise(s) and conclusion. This, no doubt, puts the evaluation-part *before* the analysis-part. Since scholars typically assert the contrary (e.g., Freeman, 2011, 141), this would at least require explanation.

More seriously yet, if we face a more complicated argument, involving more than one type of structure (i.e., a case of sub-argumentation), how should we identify which premises work separately, indicating a convergent structure, while other premises work jointly, indicating a linked structure? A more complicated method certainly seems to be required. For Walton, alas, allegedly "the same [test for two premises] applies to any number of premises in an argument" (1996, 182). One can only imagine how complicated this would be, certainly involving a great deal of evaluation before the argument's structure is identified.

Given an actual (real-life) argument, then, not only must the identification of argument structure rely on semantic information to evaluate the support relation between premises and conclusion, analysist must typically also consider how this information is used pragmatically. Besides the support relation itself, moreover, also the premises become problematic, because the tests T1 to T5 all share the supposition: 'given all the other premises are true.' A complete version of T1, for instance, should

read 'If one premise is false, and if all other premises are true, then the conclusion no longer receives any support.' Yet, even without the 'if all other premises are true'-constraint, if the conclusion no longer receives any support once some premises turns to be false, then the argument may still be convergent. After all, if all of remaining convergent premises are simply false, then the conclusion cannot receive any support.

Notice that none of the tests in Sect. 4.1 constrain which of the premise one should set to the status false or suspended. Moreover, which premise is in fact selected should be immaterial to identifying the argument structure. Otherwise, given the *same* test, an argument would implausibly have more than one structure. In other words, the selection of false or suspended premise should occur randomly. Hence, if all premises besides some randomly selected premise are considered true, then the constraint 'if all *other* premises are true' should properly read 'if *all* the premises are true.'

One consequence of this constraint is that the resulting structural identification is applicable to only one several possible versions of the argument, namely that where all premises are true. But this leaves the structure of other possible versions unidentified. Moreover, this way of identifying argument structure fails to consider whether the premises are *in fact* true, or not. Hence, should some of the premises turn out to be in fact false, or at least not certainly true, then the argument structure may change. This, no doubt, damages the theoretical value of the concept 'argument structure'.[2]

So, while we do *not* claim that the dependence-criterion is useless in identifying argument structure, we claim that tests based on the (in-)sufficiency of support or on strength-variation are useless in determining whether premises are dependent, or not. We now turn to Freeman's test.

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[2] Walton (1996, 181f.; *italics added*) presents his own preferred test, which is a revised version of T5, by the following remark on the 'if true'-condition: "block one premise out of your mind, and then ask what degree of support the other premise (*if true*) gives (by itself) to the conclusion." Yet, he avoids remarking on the consequences of doing so, namely that it would severely damage the argument structure-notion severely.

5.2 Evaluating Freeman's test

When applying Freeman's ternary relation to A-2 and A-3, the same problem as above arises. Assume one grants that A-2 instantiates a convergent and A-3 a linked structure. Following Freeman, A-2 being convergent entails that each premise—for instance, 'his swimming suit is wet'—is *individually relevant* to the conclusion. According to this understanding of relevance, anyone who agrees that A-2 is convergent should thus grant that an inference rule—e.g., 'if his swimming suit is wet, then he has been swimming'—licenses the move from 'his swimming suit is wet' to 'he has been swimming'. This, however, contradicts Freedman's own claim that A-3 is linked, because at least one individual premise—namely: 'his swimming suit is wet'—constitutes what in Freeman's sense is a relevant reason for the conclusion.

Like Freeman's support-based test, moreover, also his relevance-based test features a constraint regarding the argument to be analyzed. Recall that, using his method, a linked argument's premises fail to be individually relevant to the conclusion, yet are jointly relevant to it (see Sect. 4.2). So, in a linked argument, each premise *by itself* offers no support to the conclusion, whereas the premises must *jointly* offer at least some support to the conclusion. In a convergent argument, by contrast, since the combined premises offer a greater degree of support to the conclusion than each premise offers individually, each premise must individually offer at least some support to the conclusion. (Otherwise, the combined degree of support cannot be greater than the individual degrees of support.) In both the relevance- and the support-based tests, therefore, unless the premises jointly offer at least some support to the conclusion, the argument qualifies neither as linked nor as convergent, because the argument would otherwise pass neither of these test. This constraint again entails that argument-evaluation is prior to argument-structure identification.

6. Conclusion

On a dialectical and a logical approach alike, distinguishing linked from convergent argument structures by recurring to the dependence or relevance of premises for a conclusion is problematic, because judgements of dependence or relevance rely on

evaluating the strength of the support that an argument's premises offer to its conclusion. Since this entails that semantic and pragmatic information informs a structural evaluation, it contradicts the idea that argument structure is an analytical concept, or tool, that is methodologically prior to argument evaluation. Hence, given the dependence or relevance of premises shall be crucial to the concept of 'argument structure', we need an alternative way of judging the dependence and relevance of premises, without argument evaluation being involved, and minimally an open acknowledgement that a clean distinction between a structural and content-based analysis is currently unavailable.

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