Deduction, Induction, Conduction: An Attempt at Unifying Natural Language Argument Structure[1]

FRANK ZENKER

University of Lund, Departments of Philosophy &

Cognitive Science (frank.zenker@fil.lu.se)

Abstract: Focusing on argument as product, we give a general characterization of the conductive or pro/con argument structure and propose a simple (and incomplete) model for assigning weights (as in "weighing the pros and cons"). These weights shall indicate the *importance* of individual premises for a conclusion. We then attempt a reductive treatment of the deductive and the inductive as limiting cases of the conductive argument structure. Two sufficient, but perhaps non necessary criteria for distinguishing these structures are proposed: (i) the difference in informational content of an argument's conclusion *vis à vis* its premises and (ii) the behavior of the support that is conferred by an argument's premises upon its conclusion. The two step reduction proceeds via first constraining the range of assignable weights (conductive to inductive) to a constant value, and then restricting the informational difference between premises and conclusions (inductive to deductive). We propose two minimum conditions for the evaluation of conductive arguments. The main aim is to address a unified understanding of argumentative structure.

1. Introduction

At the top level of what might be called the most entrenched ontology of natural language argument, two structures are distinguished: the *deductive* and the *inductive* one (Sinnot-Armstrong & Fogelin 2010, Rehg 2009, Snoek Henkemans 2001). The first is characterized as an information-preserving transition from premise(s) to a conclusion, the latter as an information-enlarging transition. (Oftentimes, 'truth' or 'content' is substituted for 'information'.) The shared contention appears to be that more fine grained distinctions should be drawn "further below".

It might too early to say if *abduction* has lost the race for recognition as a third top level category. Should it loose, then presumably because its structure appears to be too similar to (reverse) deduction. Another candidate is *conduction*, proposed by Wellman (1971, 1975) and revived by Govier (1987a,b, 1999, 2001). Among its premises, conductive arguments feature counter-considerations against premises, conclusion or

[1] To be presented at the Thirteenth Wake Forest University Argumentation Conference, Winston-Salem, NC, USA, March 19-21, 2010.

both. This structure is saturated by an accumulation of individually non-decisive reasons. It is empirically validated in deliberative and interpretative contexts (Ball 1995).

With Wellman, we hold that the conductive structure should not be treated as a variant of the deductive or the inductive one.[2] In case the conductive structure would be treated as a token of the deductive structure, well-accepted properties of the deductive structure are lost, which is an undesirable outcome. Further, in case the conductive structure would be treated as a token of the inductive structure, then the distinction between 'a premise being accepted *simpliciter*' and 'a premise being accepted *and weighed* (or valued in importance)' is leveled, which is at least equally undesirable.[3]

Moreover, we claim that reducing the conductive to the inductive structure is more promising than a reduction of the conductive to the deductive structure, but nevertheless mistaken. Instead, we investigate the (presumably unorthodox) attempt of reversing this process, seeking to understand the inductive as a limiting case of the conductive structure. We think there is case to be made, and also the deductive structure might be understood as a limiting case of the conductive structure.

2.1 The conductive structure

By 'conductive structure' we refer to the abstract properties of those natural language arguments (as opposed to their contents) that are reconstructable such that:

(i) Pro-reasons and counter-considerations form (normally two) groups, the elements of which are partially ordered on *some* scale capturing the notion *comparative importance*.

(ii) Pro-reasons confer positive and con-reasons negative support to the conclusion *or* some group element.

---

[2] "[I] must admit that the reasons for a moral judgment do not logically entail it; that is, the logical connection between factual premises and moral conclusions cannot be deductive. Those who hold that all reasoning is deductive, or even either deductive or inductive, must reject my view of moral knowledge because the sort to thinking involved in weighing the pros and cons is neither deductive nor inductive." Wellman (1972, 1988: 292)

[3] This is opposed to Bickenbach and Davis's (1998: 321f.) claim: "If conduction were straightforwardly a matter of weighing (…) the argument would be either deductive or inductive".

(iii) An *on balance principle* indicates that support for the conclusion is based on or comes about by considering more than one group.[4]

The above three conditions appear sufficient to identify a conductive structure, but they are perhaps not necessary.

The conductive structure is also known as the pro/contra argument form (Naess 2005). Following Wellman (1971), who considered it in the context of case-by case (ethical) reasoning, and Govier, who later revived the term and the idea within argumentation theory, the conductive structure is characterized most markedly by its conclusion being arrived at through a *weighing of pro reasons against counter-considerations*. On Wellman's view, "[t]o claim that a statement is true is to claim that the reasons for it outweigh the reasons against it" (1971: 192). Presently, a weaker claim is accepted in the context of pro/con argument: To claim that a proposal (not a statement) is acceptable (not true) is to claim that the reasons for it outweigh the reasons against it.

Several disciplines (e.g., economics, jurisprudence, political science, psychology, philosophy) acknowledge a weighing of considerations as an indispensable feature of deliberation. However, little is known about the processes or mechanisms (if any) that sustain it. Since the 1960s, mathematical modeling is regarded to have established the principled impossibility of *always* arriving at a unique aggregated preference order (*Arrow's theorem*). Should results transfer, this goes at least some way towards explaining why little attention has been paid to the conductive structure.

Moreover, with Wellman, many are of the opinion that there is no formal or general logic that could be used to evaluate conductive arguments in the same sense that de- or inductive arguments may be evaluated. This often occurs on the grounds of a principled distinction between *practical* and *theoretical* reasoning (e.g., Kock 2009a,b).

Briefly addressing evaluative standards at the end, we are mainly concerned with relations between deduction, induction and conduction. Our starting point is to question the usefulness of the practical/theoretical distinction for argument structures.

[4] The on balance principle may be added in the reconstruction or contained in the discourse. Typically, it will be a variation on: "While I/we acknowledge your reasons for X, I/we hold that …".

2.2 Criteria for Distinguishing Deductive, Inductive and Conductive Structures

For the purpose of distinguishing the conductive from the deductive and the inductive structure, two criteria will be employed.

(i) The comparative difference between the informational content[5] of the premise-set *vis à vis* the conclusion (*informational content*);

(ii) The dynamic behavior of the support relation between premise and conclusion under premise-revision (*dynamics*).

By *support relation* we designate what is also called *argumentative strength* or *justificatory force* (van Eemeren and Grootendorst 2004). By *dynamic behavior* we designate the effect suffered by this support relation upon premise retraction or premise addition. By *premises* and *conclusion*, we designate natural language sentences and their (descriptive or normative propositional) contents. $P_{1\text{-}n} \therefore C$ shall mean that *C is* a consequence of a set of premise $P_{1\text{-}n}$, and *is not* when $\therefore$ is crossed out. De-, in-, and conductive consequences are indicated by DED, IND and CON.

When employing criteria (i) and (ii), differences are obtained in comparing paradigmatic instantiations ("toy examples") of the three argument structures. This difference shall provide support for the claim that the *weighing of pros and cons* is not merely an accidental feature of the conductive structure – a feature one were to dispense with carelessly when treating pro/con arguments under the reconstructive and standards of the deductive or inductive argument form.

2.3 The Deductive Structure

If a conclusion is a *deductive* consequence of a group of premises, then the informational content of the conclusion, I (*C*), is not greater than the informational content of the premise-group, I ($P_{1\text{-}n}$). This holds if one allows cases in which the conclusion is a premise-repetition (copy) and, moreover, requires the premise group to be individually and jointly relevant to the conclusion as well as internally consistent. Expressed concisely:

[5] 'Informational content' is understood informally; we do not attempt to provide a formal measure, likewise for 'relevance'. Consistency means that instantiations of '$p \wedge \neg p$' do not occur.

(1) If $P_{1\text{-}n} \therefore_{\text{DED}} C$, then I $(C) \leq$ I $(P_{1\text{-}n})$

It is a different question whether a premise group P_n is (externally) consistent to some other premise group P_n*, e.g., background knowledge. However, P_n must be internally consistent on pains of any conclusion following deductively (*ex falso quodlibet*).

As for dynamics, in the *deductive* case, premise strengthening (premise addition) is without effect upon the support lend to a conclusion by the premises, since *monotony* holds. (Monotony means: if a set of premises deductively entails a conclusion, *C*, then the logical conjunction of this set and any premise whatsoever will deductively entail *C*.) In contrast, premise deletion literally "destructs the argument," once one requires that the premise group feature no irrelevant premises. Expressed concisely, and with '&' for addition and '-' for contraction:

(2) If $P_{1\text{-}n} \therefore_{\text{DED}} C$, then $P_{1\text{-}n}$ & $P_{n+1} \therefore_{\text{DED}} C$ and $P_{1\text{-}n} - P_n \not\therefore_{\text{DED}} C$

As a paradigmatic (meta-level) example of a deductive structure, consider the following instantiation of disjunctive exploitation (*p* or *q*; *p* is not the case; therefore *q*).

Example of a Deductive Argument

(P1) An argument is either deductive or defective.
(P2) This argument is not deductive.
(C) This argument is defective.

This is a meta-level instantiation, as both premises are *un*acceptable, for (P1) states a non-exhaustive dilemma and (P2) states a factual falsehood. Nevertheless, the premises deductively imply (C) which is an acceptable conclusion: 'This argument is defective'.

Under the above constraints (internal consistency, relevance), and for reasons of deductive logic there can be no premise (P3), addition of which would render (C) anything less than the deductive consequence of (P1) and (P2). Therefore, *via* premise addition, one cannot change the conclusion in a deductive structure. Moreover, upon deletion of (P1) or (P2) from the premise group, (C) could only remain a deductive conse-

quence, if (P1) or (P2) are replaced. In other words, to *maintain* deductive support, premise deletion requires premise addition (i.e., revision).

The above considerations set the stage for the claim that, if the conductive structure is a limiting case of some other structure, then it seems implausible to assume that the reducing structure will be deductive.

2.4 The Inductive Structure

If a conclusion is the *inductive* consequence of a group of premises, then the informational content of the conclusion is larger than the informational content of the premise-group (*ampliative*).

(3) If $P_{1\text{-}n} \therefore_{\text{IND}} C$, then I (C) > I $(P_{1\text{-}n})$[6]

As for dynamics, in the inductive case, both premise addition and premise deletion will *necessarily influence* the support lent to the conclusion by the premises, indicated by a subscripted 'IND+/-'. This holds under the same constraints as in the deductive case (consistency, relevance).

(4) If $P_{1\text{-}n} \therefore_{\text{IND}} C$, then $P_{1\text{-}n}$ & $P_{n+1} \therefore_{\text{IND+/-}} C$ and $P_{1\text{-}n}$ - $P_n \therefore_{\text{IND+/-}} C$

As a paradigmatic (object-level) example of an inductive argument, consider the following instantiation of the statistical syllogism. It is a variation on one of Toulmin's (1958) examples.

Example of an Inductive Argument

(P1) Peter was born in Sweden.

(P2) 90% of Swedes are Protestants.

(C) Peter is a Protestant.

---

[6] To meet the objection that there are cases of *enumerative induction* (e.g., 'This marble is black, so is this, and this … etc; therefore: All marbles are black') in which the content of the conclusion is *equivalent* to the content of premises set, one may change this condition to: If $P_{1\text{-}n} \therefore_{\text{IND}} C$, then I $(C \wedge P_{1\text{-}n})$ > I $(P_{1\text{-}n})$. As it stands, (3) captures cases of inducing content going beyond one's data base.

Under the above constraints (internal consistency, relevance), there may – for empirical reasons – be a premise (P3), addition of which ceases to render (C) the inductive consequence of (P1) and (P2), e.g.

(P3) Peter's parents emigrated from China 15 years ago.

Thus, *adding* to the premises of an inductive argument can weaken the premise-conclusion support. In the two premise example above, premise-deletion will also *destruct* the argument. This mirrors the deductive case. However, for inductive arguments with more than two premises, premise addition/deletion affects the premise-support relation in a less drastic manner. Normally, premise change will strengthen *or* weaken the inductive support lend upon the conclusion. Only in cases of unexpected new information would support be cancelled. If so, then the negation of *C* is supported.[7]

2.5 Reasons against a Conclusion vs. Reasons against Premises

With respect to the inductive example, above, (P1) and (P2) are reasons *for* the conclusion, (C), while (P3) is a reason *against* (C), possibly in conjunction with a premise expressing that China's population is not predominantly of protestant belief. Furthermore, for any con-reason to undermine the conclusion of a deductive argument requires undermining the consistency requirement levied onto the premise group. Therefore, a reason against a deductive consequence is also a reason against at least one premise. As (P3) shows, in the inductive case, this is not so. (P1-P3) are jointly consistent.

In the three premise inductive example (P1-P3), the geographic origin of one's family is not logically inconsistent with one's own nationality and that nation's religious proportions. (P1-P3) are logically independent. Rather, the Chinese heritage of Peter's parents, as expressed in (P3), provides a reason against the conclusion (Peter is a Protestant) standing in an inductively strong support relation to the premises. (P3) is not a reason undermining a group element (P1, P2). Likewise,

(P4) Peter has dark eyes and black hair.

[7] In probabilistic terms, one expresses this by considering a conclusion, *C*, (rather than *non C*) to be inductively supported as long as its (objective or subjective) probability lies between]0.5, 1[.

may be construed as a reason against the conclusion, though not a decisive one.

2.6 The Conductive Structure

If a conclusion is the *conductive* consequence of a group of premises, then the informational content of the conclusion is greater than that of the premise group. This mirrors the inductive case.

(5) If $P_{1\text{-}n} \therefore_{\text{CON}} C$, then I ($C$) > I ($P_{1\text{-}n}$)

Unlike the inductive case, the pro and the con premises groups *can*, but they need not be jointly consistent. Moreover, adding or retracting a relevant premise from either the pro or the con group *can*, but need not result in a difference with respect to the support which is conferred by the premise groups upon the conclusion. This means that a conductively supported conclusion will *not necessarily be less supported* once a reason is retracted, nor necessarily any *more* supported when one is added. This holds under the relevance constraint on premises.

(6) If $P_{1\text{-}n} \therefore_{\text{CON}} C$, then $P_{1\text{-}n} \,\&\, P_{n+1} \therefore_{\text{CON}} C$ and $P_{1\text{-}n} - P_n \therefore_{\text{CON}} C$

The distinct support behavior under premise-change can be explained by the independent relevance of the premises for the conclusion and by an arguer not only retracting or expanding premises, but also updating their *importance*. Both explanations do not exclude, but rather complement another. The odd connection between premise revision and support-strength appears to be the most marked difference between the conductive and the inductive argument form.

As a paradigmatic example of a conductive argument, consider the following. Here, (CC) stands for *counter-consideration*, (PR) for *pro-reason* and (OBP) for *on-balance premise*; order and numbering are presumed to be arbitrary.[8]

[8] Considerations of persuasive effect may pertain to the order in which pro and con reasons are presented, e.g, 'pro followed by con, etc., followed by conclusion' or *vice versa* or 'pro/con, pro/con, etc, followed by conclusion'. Here, we neither address these, nor any dialectical considerations.

Example of a Conductive Argument

(CC1) Aircraft travel leaves a large environmental footprint.

(CC2) Aircraft travel is physically exhausting.

(CC3) Aircraft travel is comparatively expensive.

(CC4) Airports do not always route baggage correctly.

(PR1) Aircraft travel is comparatively fast.

(PR2) I am overworked and likely able to sleep on the plane.

(PR3) My department reimburses travel expenses.

(PR4) Environmental footprint-differences can be compensated by purchase.

(OBP) PR1-PR4 outweigh/are on balance more important than (CC1-4)

(C) It is apt to travel to the conference by aircraft (rather than by train).

The near-triviality of the example is on purpose.[9] (PR3) could be retracted, e.g., upon coming to learn that the department cannot reimburse 100% of travel cost. This would constitute (CC5). Also (CC2) could be retracted and modified, e.g., upon coming to learn that one will fly first class or likely have an entire seat-row to oneself. Finally, a family member's acute illness could be a counter-consideration against a presupposition of the conclusion (namely to travel to the conference in the first place), *without* pertaining to any of the pro reasons.

In this example, (PR2-PR4) counter (CC1-CC3), while (PR1) is not addressed by a counter-consideration ("is open"). It is difficult to discern how (PR1) could be addressed, other than by cancellation of a presupposition. Moreover, (CC4) remains unaddressed by any pro-reason. It might be countered by stating that the objective probability of *my* baggage (as opposed an average piece of baggage similar to mine) being routed incorrectly on *my* flight (as opposed to an average flight like mine) is epistemically inaccessible to me. Hence, the accessible probability of the event in question is a subjec-

[9] To decide for or against aircraft travel is trivial compared to larger issues of social and political significance, e.g., global warming, population growth, genetic engineering, aging societies.

tive credence value. This should be less important than considerations that do not depend on subjective credence, such as the environmental footprint.

2.7 Closure Principle vs. On Balance Principle

Featuring both pro *and* con reasons, the conductive argument form bears a stronger resemblance to the inductive than to the deductive argument form. For reasons of consistency and monotony (discussed above), to respect the pertinence of counter-considerations appears not possible in the deductive form. As a necessary evaluative condition, the 'principle of total evidence' associated with induction requires a conclusion to count as inductively supported *only if* all relevant reasons are collected in the premise group, some of which may be counter-considerations to a conclusion.[10]

The inductive closure principle resembles the 'on-balance premise' of a conductive argument. However, the inductive closure principle serves a different purpose than the on-balance premise in a conductive argument. Like the conductive principle, it signals that the transition to the conclusion occurs relative to a finite premise group. Additionally, it spells out the normative demand that this group be *exhaustive* or complete with respect to relevant considerations.

In contrast, the on-balance premise of a conductive argument indicates a descriptive truth, namely that the transition from the premises to the conclusion occurs on the basis of (at least) two particular groups of premises, the pro and the con group. But there is usually no indication that these groups satisfy additional normative standards. Rather, such a requirement is levied onto the argument when evaluating it.

2.8 The dynamics of the premise groups

Premise groups of a conductive structure may (in principle) be thought of as dynamic. More precisely, the groups of premises claimed to be positively or negatively relevant to a conclusion may be understood as *dynamic* in two senses.

In a *simple sense*, groups are dynamic because *new* reasons pro/con a given conclusion can always be added to the premise set. This at least holds in principle. *De facto*, it is not readily apparent to what extent the presumed openness of the pro/con premise

[10] It is another matter if one can *know* (or have epistemic access) that the principle is sufficed. But it is a correct criterion nevertheless.

group translates into *qualitatively* new reasons. Clearly, new reasons may again relate favorably or unfavorably either to the conclusion or to the premises. This, however, is also the case in the inductive structure.

In a *less simple sense*, the group of premises in a conductive structure remains dynamic with respect to the positive support conferred upon the conclusion by the pro-reasons and the negative support by the con-reasons which undermines the conclusion, as each reason in the pro and the con group can be assigned (what may most generally be called) an *evaluative mark*.

This mark can, but need not be represented by a numeral. If it is, one speaks of a *weight*. Weights may be captured as a function assigning a real number to a premise.

(7) $w(P_n)$ -> R+

Thus, over and above (positive or negative) support for a conclusion, the differential support-*contribution* to that conclusion is indicated (Scriven 1981).

2.9 Towards Evaluative Criteria

In turn, the support which the conclusion in a conductive structure receives from the premises is represented as the difference of summed weights of pro and con reasons. In other words, for one conclusion (rather than another) to be the conductive consequence of a group of *pro and con* premises, the comparison must yield a weight-*difference*.[11]

(8) If $Pro_{1\text{-}n}$, $Con_{1\text{-}n}$ $\therefore_{\text{CON}} C$, then $\sum w(Pro_{1\text{-}n}) / \sum w(Con_{1\text{-}n}) \neq 1$

The comparative importance of a reason *vis à vis* a counter-consideration cannot be represented in the inductive case – at least not without leveling the distinction between 'a premise being accepted *simpliciter*' *vs*. 'a premise being accepted *and weighted in a particular manner*'. Indications of a premise's importance for a conclusion appear to be different from and are, perhaps, independent from indications of its probability. After all, (im)probable premises can but need not amount to (un)important considerations.

[11] One might demand that this difference go above some threshold, to indicate that it is significant.

Through the assignment of comparative importance (*via* weights), then, the inductive and the conductive argument structure come apart. Crucially, the weight-update upon premise change suffices to explain that conductively supported conclusions do not necessarily change upon contraction or addition or relevant premises.[12]

3. Two-Step Reduction

One may object that, on this understanding, a conductive argument is but an inductive one in which the premises are consistent, relevant and each bear a weight which reflects the premises' comparative importance for supporting the conclusion. Therefore, one might say, the conductive structure reduces to the inductive one in the limiting case where the assigned weights all take the same value.

While *prima facie* plausible, it is a reduction *in the opposite direction* which harbors the potential for unifying argument structure. That is, rather than viewing the conductive structure as a limiting case of the inductive one, one might view the inductive structure as a limiting case of the conductive structure.

Once this move is accepted, the possibility for extending this reduction to the deductive structure arises. That is, one may try to understand both the inductive and the deductive structure as *successively reached* limiting cases of the conductive structure. The conductive structure would then be the richest of the three structures.

In the first step, to generate the inductive structure from the conductive one, the range of assignable weights is constrained from R+ to some constant value. In the second step, to generate the deductive structure from the inductive one, the informational content of the conclusion is reduced from $I(C) > I(P_{1\text{-}n})$ to $I(C) \leq I(P_{1\text{-}n})$.[13]

The two sufficient (though perhaps non-necessary) criteria, *informational content* and *dynamics*, continue to distinguish the three structures. The principled difference between the conductive and the inductive structure is that weights can be updated dynamically upon premise change in the conductive but not the inductive structure.

The following summarizes the desiderata. (Ps) indicates constraints on premises.

---

[12] By allowing the update of weights, one may account for the observation that, although a premise is retracted in response to a rebuttal/criticism, the proponent still maintains her conclusion.

[13] A formally cleaner reduction by which the inductive and the deductive structure are rendered as limiting cases of the conductive structure can be achieved when allowing the conductive structure to satisfy: $I(C) \geq I(P_{1\text{-}n}) \vee I(C) \leq I(P_{1\text{-}n})$. This condition may be less counterintuitive than it appears.

Deductive

(D1) $I(C) \leq I(P_{1\text{-}n})$

(D2) $P_{1\text{-}n}$ & $P_{n+1} \therefore_{DED} C$ and $P_{1\text{-}n}$ - $P_n \not\therefore_{DED} C$

(D3) $w(P_n)$ = constant

(Ps) relevance, consistency

Inductive

(I1) $I(C) > I(P_{1\text{-}n})$

(I2) $P_{1\text{-}n}$ & $P_{n+1} \therefore_{IND+/-} C$ and $P_{1\text{-}n}$ - $P_n \therefore_{IND+/-} C$

(I3) $w(P_n)$ = constant

(Ps) relevance, consistency

Conductive

(C1) $I(C) > I(P_{1\text{-}n})$

(C2) $P_{1\text{-}n}$ & $P_{n+1} \therefore_{COND} C$ and $P_{1\text{-}n}$ - $P_n \therefore_{COND} C$

(C3) $w(P_n)$ = R+

(Ps) relevance

4. Discussion

If a unification of argument structures is achieved here, then because the weights (which arise in reconstructing conductive arguments) are "carried through" to the deductive and inductive structure (where they do not arise). Since these weights are set to a constant value in the in- and the deductive case, they do not matter there. They are "hidden".

We lay no claim to the psychological reality of weights. The above is only a model, and needs to be developed. In particular, allowing weights from R+ appears to be too large a region. A smaller interval could suffice. The choice might depend on one's evaluative purposes, likewise for any (non-zero) minimal weight requirement.

On our proposal, the conductive structure can, but it need not be treated as a third top level category. Rather, the three structures can be understood as variations along the dimensions 'informational content-difference between premise and conclusion' and '(premise conclusion) support behavior under premise change'.

Furthermore, taking the differential importance of premises seriously – by treating weights as more than a mere metaphor – seems to have implications with respect to evaluating conductive arguments. As indicated above, if there is *no* weight difference between the summed weights of pro and con reasons, then – whatever the conclusion, (C), may state – it cannot be more supported than its negation (non C) or any conclusion entailing (non C). Hence, for any claim that a particular conclusion is, on balance, (significantly) *more* supported than another, there will be a weight assignment that makes it so. Consequently, the weight-update in response to new information can be traced. With respect to this update, then, additional normative constraints might be spelled out.

Finally, provided the claim is raised – as it normally is when compromises between conflicting positions are argumentatively supported – that counter-considerations are *respected* or *acknowledged* in a conclusion, then an evaluative condition consist in not allowing the assignment of the weight zero to any counter-consideration. Content-wise, then, each counter-consideration must somehow be *discernible* in the conclusion, unless the claim to having acknowledged it is simply false.

5. Conclusion

On two criteria, namely the *difference in informational content between premises and conclusion* and the *dynamic behavior of the support for the conclusion upon premise change*, the deductive, the inductive and the conductive argument structure can be distinguished. By allowing weights to be assigned to premises (which are variable in the conductive, yet constant in the deductive and the inductive structure), the three structures may be understood as variations on these two criteria.

This unification was achieved by taking the weight metaphor ("weighing pros against cons") seriously. Building on the assignments of weights, two minimum evaluative conditions for conductive arguments were proposed, namely the *non-zero difference between summed weights* and the *non-zero weight for con-reasons*. The first addresses the origin of considerations which lead to an *imbalance* between pro and con reasons, the second that of *falsely* claiming to acknowledge counter-considerations.

Further conditions may become available as the model is developed. Crucially, the region R+ appears too large to be useful in evaluation. Future work should investi-

gate overlaps (if any) with probabilistic modeling and importance measures, for example those used in risk assessment.

Acknowledgements

I would like to thank the organizers and audiences at the higher seminar in theoretical philosophy at Lund University and at the Center for Research in Reasoning, Argumentation Theory and Rhetoric at the University of Windsor, Ontario, where earlier drafts of this paper were read. I am particularly indebted to Ingvar Johansson and Erik Olsson, as well as Anthony Blair, Tom Fisher, Hans Hansen, Ralph Johnson, Robert Pinto and Christopher Tindale for support and insightful comments. Funding was provided by the Swedish Research Council.

References

Ball, W.J. (1995). A Pragmatic Framework for the Evaluation of Policy Arguments. *Review of Policy Research* 14, 3-24.

Bickenbach, J.E. & J.M. Davies ([1]1997, 1998). Conductive Reasoning. In: *Good Reasons for better arguments. An Introduction to the skills and values of critical thinking*. Peterborough, ON: Broadview Press, 321-326.

Eemeren, F.H. van & R. Grootendorst (2004). *A systematic Theory of Argumentation. The pragma dialectical approach*. Cambridge: Cambridge University Press.

Govier, T. (1987a). Two Unreceived Views about Reasoning and Argument. In: *Problems in Argument Analysis and Evaluation*. Dordrecht: Foris.

Govier, T. (1987b). Beyond Induction and Deduction. In: Eemeren, F. H. van et al. (ed.). Argumentation: Across the lines of discipline. Proceedings of the conference on argumentation 1986. Dordrecht: Foris.

Govier, T. (1999). Reasoning with Pros and Cons. Conductive Arguments Revisited. In: *The Philosophy of Argument*. Newport, VA: Vale Press.

Govier, T. (2001). *A Practical Study of Argument* (5th edition). Belmont, CA: Wadsworth.

Kock, C. (2009a). Choice is Not True or False: The Domain of Rhetorical Argumentation. *Argumentation* **23**, 61-80.

Kock, C. (2009b). Constructive Controversy: Rhetoric as Dissensus-oriented Discourse. *Cogency* **1**, 89-115.

Naess, A. (2005). Surveys of Arguments for and Against a Standpoint. In: Glasser, H. et al. (eds). *The Selected Works of Arne Naess. Vol. 7. Communication and Argument*. Dordrecht: Springer, 75-95.

Rehg, W. (2009). *Cogent Science in Context. The Science Wars, Argumentation Theory and Habermas*. Cambridge, MA: The MIT Press.

Scriven, M. (1981). The "Weight and Sum" Methodology. *American Journal of Evaluation* **2**, 85-90.

Sinnot-Armstrong, W. & R.F. Fogelin (2010). Understanding Arguments. An Introduction to Informal Logic (8th edition). Belmont, CA: Wadsworth Cenage Learning.

Snoek Henkemans, A.F. (2001). Argumentation Structures. In: Eemeren, F.H. van (ed.) *Crucial Concepts in Argumentation Theory*. Amsterdam: SicSat, 101-134.

Toulmin, S. E. (1958). *The Uses of Argument*. Cambridge: Cambridge University Press.

Wellman, C. (1971). *Challenge and Response*. Carbondale, IL: Southern Illinois University Press.

Wellman, C. ([1]1975, 1988). *Morals and Ethics* (2nd edition). Englewood Cliffs, NJ: Prentice-Hall.