How to Say 'Yes' or 'No':

Logical Approaches to Modes of Assertion and Denial

Book of abstracts

Edited by

MASSIMILIANO CARRARA, DANIELE CHIFFI, CIRO DE FLORIO

How to Say 'Yes' or 'No':

Logical Approaches to Modes of Assertion and Denial

Book of abstracts

Edited by

MASSIMILIANO CARRARA, DANIELE CHIFFI, CIRO DE FLORIO

How to Say 'Yes' or 'No':

Logical Approaches to Modes of Assertion and Denial

(book of abstracts)

Edited by

Massimiliano Carrara, Daniele Chiffi, Ciro De Florio

21-22 January 2016; University of Salento; Lecce (Italy).

https://sites.google.com/site/howtosayyesorno/

ISBN n.: 978-1-326-51692-5

Lulu Press, Inc. - 2016

3101 Hillsborough St, Raleigh, NC 27607

Cristina Barés Gómez (Logic, Language and Information Group. Sevilla University, Spain)

Negative Evidential Paradigm as a Particular Negation in Natural Language

The main goal of this communication is to offer a complete analysis of the negative particles la/al in Ugaritic, as an example of negation that has a particular behaviour. These particles are two of the four negations that we can find in this language. Their behaviour is not common in natural language. Indeed, they change from positive to negative in modal contexts, conditional, questions, disjunctions, etc. Usually, these Ugaritic negations have been studies from a Semitic and linguistic points of view and there is no explanation to this unusual behaviour. My aim is to provide, not only the linguistic point of view, but also the philosophical and logical perspectives. How a negation can change from negative to positive depending on the context? Are we facing a new non-classical kind of negation?

In this talk, I will offer an overview of the negative particles from a Semitic Linguistic point of view and its relation with what has been called asseverative paradigm in Semitic languages. There are different

particles with a special behaviour inside the asseverative paradigm, but they have never been studied in relation with the negation. I analyze several occurrences of these particles on the correspondence texts. I choose these texts because they are made to be read aloud. I compare these negations with other negations founded in different languages and I argue why these kinds of negation do not match with Ugaritic negation. We are not facing a metalinguistic negation, propositional negation or a polarity item or a scalar negation. Thereafter, I will offer a new approach to these la/al particles that may explain how they behave. I interpret these negations as a negative evidential paradigm and I explain how they change in different contexts. For that, I use dynamic epistemic logic with public announcement. This is not a classical logical negation, but to grasp it, we need to take into account more features. At the end, I open the discussion to epistemological problems and how the expression of knowledge, or the lack of it, in natural languages might help us to understand how the real agents use the knowledge.

AIKHENVALD, A. Y. *Evidentiality*. Oxford University Press, 2004.

BALTAG, A., van DITMARSCH, H., Y MOSS, L. *Handbook on the Philosophy of Information*, c. Epistemic Logic and Information Update. Elsevier Science Publisher, 2008.
BARES-GOMEZ, C. *Lógica dinámica epistémica para la evidencialidad negativa*. College Publications, London, 2013.
CUNCHILLOS, J.L. *Textes Ougaritiques: Correspondance*, II. Les éditions du cerf, Paris, 1989.
van DITMARSCH, H., van der HOEK, W., and KOOI, B. *Dynamic Epistemic Logic*. Springer, 2008.
HINTIKKA, J. *Knowledge and Belief. An introduction to the logic of the two notions*. Cornell University Press, 1962.
HORN, L.R. *A natural history of negation*. CSLI Publications, Chicago, 1989 - 2001.
PORTNER, P., and PARTEE, B. H., Eds. *Formal Semantics. The essential reading*. Blackwell Publishing, 2002.
PORTNER, P. *Modality*. Oxford University Press, New York, 2009.
TROPPER, J. *Ugaritische Grammatik. Alter Orient und Altes Testament*, Münster , 2000.

Gianluigi Bellin, (University of Verona)

TBA

Filip Buekens (Tilburg University and University of Leuven)

Saying 'Yes' and 'No' in informing games and alignment games

I examine the discursive (or dialogical) role of judgements about what is funny, agreeable, attractive, followed by an endorsement or a rejection. Judgements of taste (their content and the speech acts performed when making those judgements) will be explored in the context of coordination games. The game theoretical template for a public dispute over matters of taste is *Battle of the Sexes*: in an exchange over what is fun (tasty, beautiful), players often seek to coordinate their first order values or preferences in view of second order preferences that are presupposed and not under dispute. Endorsing and rejecting are *public signals* in an exchange in which players seek to reach an equilibrium.

Speech act theory has always allowed that speakers can perform different speech acts simultaneously. In a dispute over matters of taste they play two games simultaneously – the game of *informing* others and the *alignment of preferences* game. These games make different propositional contents salient and have different ulterior

goals – varying from the creation of bonds to coordination with a view to satisfy common interests. When the focus is on the informing dimension of judgments of taste, the focus is on an exchange of information, which can be modelled as a *Trust or Assurance game*. When playing the informing game, endorsement and rejection make little sense, since endorsing *what is funny according to the speaker* would entail, on Gricean grounds, that the contribution to the dialogue was not informative at all. That explains intuitions behind expressivism about matters of taste, which holds that such statements don't have truth conditions. Endorsing and rejecting, in the context of an alignment game, publicly signals agreement c.q. conflict between values or preferences. I conclude with a diagnosis of contextualist and assessment relativist approaches to predicates of personal taste. Contextualists model endorsement and rejection of judgements of taste in trust games, while assessment relativists locate the exchange in the context of a coordination game.

Ciro De Florio (Catholic University, Milan), **Massimiliano Carrara** and **Daniele Chiffi** (University of Padua)

On Pragmatic Denial

We consider Dalla Pozza and Garola (1995) *logical framework for pragmatics* (LP) where the speech act of assertion and its soundness conditions are fomalized. Is it possible to extend LP so to include also the speech act of denial? We start from the classical equivalence:

(i) $v(\dashv A) = \mathrm{J} \Leftrightarrow v(\vdash \neg A) = \mathrm{J}$

where '$\dashv$' is a symbol for denial. The informal meaning of (i) is that it is justified to deny A if and only if it is justified to assert $\neg A$. *Prima facie*, (i) is just a translation, in an extension of LP, of the following basic idea: assertion and denial are mutually incompatible speech acts. But, in LP, $\vdash \neg A$ entails $\sim \vdash A$ where the last formula means that there is a proof that A has not been proved. So the direction from left to right of (i) does not work: it is too strong. One could be justified in rejecting A even if she has

not at disposal a proof of $\neg A$. The converse, instead, holds. If there is a proof of $\neg A$ it is rational to deny A:

(i*) $v(\vdash \neg A) = J \Rightarrow v(\dashv A) = J$.

Moreover, observe that (i) should be taken distinct from (ii):

(ii) $v(\dashv A) = J \Leftrightarrow v(\vdash A) = U$

where the informal meaning of (ii) is that it is justified to deny A if and only if there is not a proof for the truth of A. Again, (ii) does not work too. It is too weak: if there is no conclusive proof for A why should I have to deny it? It is commonsensical to observe that we use to accept scientific hypotheses without having a conclusive proof for them. Intuitively, it seems that a characterization of denial of A should be, say, in the middle between the proof of $\neg A$ and the absence of a proof for A.

Notice that the reason on the basis of which (i) does not hold can be explained by means of an intuitive concept of disproof: whilst a proof of A is also a disproof of $\neg A$, a disproof of A is not always a proof of $\neg A$.

Our aim is, then, to give a semantic framework to account for this asymmetry between proof and disproof. Our starting idea is that:

(iii) for any A, $v(\dashv A) = J$ there exists at least a B which is – in some way – incompatible with A.

In the paper we will exploit (iii) with a neighborhood semantics (Montague, Scott) where it is possible to define a set D such as for any possible world $w \in W$, Dw is the set of incompatible worlds with respect to w. We provide a logical framework to characterize justification conditions for denial.

Tamara Dobler (University of East Anglia)

Situated Assertion

Since Frege it is common to distinguish two independent elements in a statement: *its content* (thought, proposition) and the *force* with which it is made. Because assertion and question share the same content, it is assumed that the assertive or interrogative force are detachable from the proposition they assert or question. On this picture, the content determines correctness conditions, whilst the force determines a currency in which correctness will be measured (truth,

response, answer, obedience etc.) The first one to challenge the idea that content and force are separable in this way was Wittgenstein in *Philosophical Investigations*. There he made an important point: namely, the fact that declarative sentences allow to be paraphrased so that the assertion operator (*It is asserted*) is detached from what is asserted (*that such and such is the case*) does not licence a further claim that we thereby perform two distinct acts, *entertaining* a proposition (which amounts to knowing when it would be true) and *asserting* the proposition (assigning it a truth-value). Wittgenstein wants to resist this further assumption because, first, he argues that there are *countless* different purposes for which sentences are used besides for asserting, questioning or commanding, and, second, a purpose for which a sentence is used plays an *essential* role in understanding its content. So it's misleading to think that content and force are independent in the way that Frege suggests.

In this talk I aim to outline a Neo-Wittgensteinian alternative to the Fregean picture of assertion based on examples that are in the literature known as 'Travis cases' (after Charles Travis). These cases demonstrate that the same declarative sentence with the same (assertive) force when embedded in different scenarios has two

different truth-values, so two different sets of truth-conditions. These examples have been extensively discussed in the literature on contextualism, compositionality, and the semantics-pragmatics distinction. However, their impact on the philosophical theory of assertion hasn't been systematically studied. My goal is to show that Travis cases offer a new conceptual model of the relation between content and force, where

(i) the former is not ontologically independent of the latter, and (ii) the idea of force extends to include wider projects within which assertions are made. Furthermore, if content is shaped by force, in the way that Travis cases suggest, then this will also have some interesting consequences for our understanding of negation and disagreement. It has already been observed that, if contextualism is correct, then the statements with *prima facie* contradictory contents but made in different contexts, should not be inconsistent (Schiffer 1996). But speakers judge they are. I argue that this is not because speakers are "semantically blind", but their intuitions are not prompted by proper examples, which is why they draw conclusions about content based on formal relations (i.e. that $\neg p \wedge p$ are contradictory).

Marie Duží (VSB-Technical University of Ostrava)

Two kinds of negation and presuppositions

Sentences often come attached with a presupposition that is entailed by the positive as well as negated form of a given sentence. Thus if the presupposition of a sentence *S* is not true, the sentence *S* can be neither true nor false. I follow Frege and Strawson in treating survival under negation as the most important test for presupposition. However, there are two kinds of negation, namely Strawsonian narrow-scope and Russellian wide-scope negation. While the former is presupposition-preserving, the latter is presupposition-denying. This issue has much in common with the difference between topic and focus articulation within a sentence. I will show that whereas articulating the topic of a sentence activates a presupposition, articulating the focus frequently yields merely an entailment. The point of departure is that sentences of the form "The *F* is a *G*" are ambiguous. Their ambiguity stems from different topic-focus articulations of such sentences. The point is this. If 'the *F*' is the topic phrase then this description occurs extensionally, i.e. with de re

supposition, and the Strawsonian analysis appears to be what is wanted. On this reading the sentence presupposes the existence of the descriptum of 'the *F*'. The other option is '*G*' occurring as topic and 'the *F*' as focus. This reading corresponds to Donnellan's attributive use of 'the *F*' and the description occurs intensionally with de dicto supposition. On this reading the Russellian analysis gets the truth-conditions of the sentence right. The existence of a unique *F* is merely entailed.

From a logical point of view, the two readings differ in the way their respective negated form is obtained. Whereas the Strawsonian narrow-scope negated form is "The *F* is not a *G*", the Russellian wide-scope negated form is "It is not true that the *F* is a *G*". Thus in the former case the property of not being a *G* is ascribed to the individual, if any, that is referred to by 'the *F*'. On the other hand, in the Russellian case the property of not being true is ascribed to the whole proposition that the *F* is a *G*. I will prove that these two readings are not equivalent, because they denote different propositions. While "The *F* is not a *G*" lacks a truth-value at those states of affairs where the *F* does not exist, the wide-scope negation "It is not true that the *F* is a *G*" is true at such states of affairs where

there is no *F*. To capture this difference, a logic of partial functions is needed. My background theory is Transparent Intensional Logic (TIL). TIL is an expressive logic apt for the analysis of sentences with presuppositions, because within TIL we work with partial functions, in particular with propositions with truth-value gaps. These features enable me to define a general analytic schema of sentences associated with a presupposition, which is another novel contribution of this paper.

Pasquale Frascolla (University of Basilicata)

Wittgenstein on Truth and Assertibility: the Role of the Disquotational Schema

The paper focuses on the pivotal role played by the Disquotational Schema in Wittgenstein's overall reflection on truth, from the *Tractatus* to the last writings. First, the Schema is shown to be derivable from the main semantic and ontological principles of the picture theory. Then, by expanding on the later Wittgenstein's remarks that are relevant to the topic, the paper scrutinizes the way the Disquotational Schema provides the basis for a description of the local practices of making assertions, in which the notion of truth

makes room for that of warranted assertibility as the key-notion. Lastly, the issue of how Wright's Argument from Informational Neutrality could be neutralized from Wittgenstein's viewpoint is dealt with.

Matthieu Fontaine (UMR CNRS 8163 «Savoirs, Textes, Langage», Lille, France) - Joint work with: **Mathieu Beirlaen** (Ruhr Universtät Bochum, Bochum, Germany)

Inconsistencies and the Use of Negation in an Adaptive Dialogical Logic

Paraconsistent logics are logics which do not support explosion. This means that even when inconsistencies appear in the process of a proof or an argumentation, we cannot infer anything; by relying on the *Ex Falso Sequitur Quodlibet*. Paraconsistent logics are adequate for modelling real argumentative practices. It is not unusual, for example, to encounter theories which contain inconsistencies and this is not always a sufficient reason to give them up [3]. How is it possible to adapt the argumentative practices to the apparition of

inconsistencies? In this talk, we will propose a study of the use of negation in argumentative practices and we will present an *Inconsistency-Adaptive Dialogical Logic* based on a combination of some aspects of the paraconsistent dialogical logic of Rahman & Carnielli [4] and the adaptive logic framework of Batens [1, 2]. In bringing these frameworks closer together, we obtain a very powerful mechanism for the systematic study of dialogues in which two parties exchange arguments over a central claim, in the possible presence of inconsistencies.

In dialogical logic, a proof is conceived in terms of argumentative game; i.e. in terms of an argumentative interaction between the proponent of a thesis and an opponent to that thesis. Dialogues are defined according to two kinds of rules: the local rules give the meaning of the connectives in terms of attack and defence; the structural rules define the general organization of a dialogue. The dialogical pluralism is grasped at the structural level: by changing the structural rules, we define various different logics. Whereas dialogical logic has often been claimed to be a dynamic approach to argumentation by the dialogicians themselves, dialogical logic has often been defined in a monotonic way, without allowing any real

dynamicity with respect to the application of the rules. By combining dialogical logic with some aspects of adaptive logics, we aim at giving an actual dynamic turn to dialogical logic; in particular with respect to the application of the rule for the negation. Indeed, in the *Inconsistency-Adaptive Dialogical Logic* we will present, the negation can be attacked by some specific "conditional moves" the success of which depends on the context of argumentation and the (in-)consistent behaviour of the formulas at stake in the game. Such behaviour is usually determined in adaptive logic in relation to a presupposed set of abnormalities. The sharp distinction of the local, structural and strategic level in dialogical logic renders possible an adaptive logic without any presupposition of a set of abnormalities.

[1] Diderik Batens. 2000. «A survey of inconsistency-adaptive logics». In Batens, Priest, and Van Bendegem (eds), *Frontiers of Paraconsistent Logic*. Baldock: Research Studies Press, King's College Publications: 49-73.

[2] Diderik Batens. 2007. «A universal logic approach to adaptive logics». *Logica Universalis*: 1: 221-242.

[3] Joke Meheus. 2002. *Inconsistency in Science*. Springer.

[4] Sahid Rahman and Walter Carnielli. 2000. « The dialogical approach to paraconsistency ». *Synthese*, 125(1-2):201-232.

Aldo Frigerio (Catholic University, Milan)

The meaning of negation in natural languages

The aim of my talk is to illustrate the manifold uses of negation in natural languages. Of course, negation can target the propositional content of a sentence or part of the propositional content (as the scope relations demonstrate). However, it can target also any other aspect of what is communicated by an utterance of a sentence in a context: linguistic acts, conventional implicatures, presuppositions, conversational implicatures, secondary aspects of meaning and even pronunciation. After having rejecting the hypothesis that negation is ambiguous in natural languages, an attempt to characterize what these uses have in common will be made. The basic idea is that, by using a negation sign, the speaker expresses her refusal against some aspect of the sentence meaning or form.

Alessandro Giordani (Catholic University of Milan)

An Epistemic Theory of Conditioned Rejection

A common view on the connections between rejection, denial and negation is modeled according to the following equivalence theses:

ET1: denying = asserting a negation

ET2: rejecting = assenting to a negation

Furthermore, assuming that in asserting we express assent, denying is identified with expressing dissent, which is in turn identified with assent to a negation. Finally, assuming that assenting is the epistemic act corresponding to the epistemic state of belief, asserting is identified with manifesting a belief, while denying is identified with manifesting a belief in a negation.

In this paper I am going to present an analysis of rejection by building on explicit epistemic logic. The general result is that rejection is not to be identified with believing in the negation of a proposition, but with a frame-dependent epistemic act, where a frame for an epistemic act is assumed to consist of a pair $(\Sigma,\mathbf{T})$, where

- Σ is a set of subject matters

- **T** is a set of reference theories

The basic intuition underlying such an approach is that the explicit form of assent is to be construed as saying that there is a justifier, more precisely a subjective sufficient justifier constructed in a theory $T_i \in \mathbf{T}$, for asserting a proposition φ as a solution to a specific problem relative to subject matter $\sigma \in \Sigma$. Correspondingly, the explicit form of a rejection is to be construed as saying that there is a justifier in a theory $T_j \in \mathbf{T}$, not necessarily coincident with T_i, for concluding that it is absurd to assume that φ is a solution to that problem relative to the same subject matter. Hence, assent and rejection are conceived as conditioned by a subject matter and constrained by a theory, so that, as we will see, a change in subject matter might induce a corresponding change in the epistemic act and a change in the reference theory might induce a change in the act even relative to the same subject matter.

In modeling this kind of states, I will extend the usual systems of epistemic logic in two directions: (i) by introducing a partition of the epistemic space into cells, corresponding to different conceptual frames determined by pairs (σ,T) of theories and subject matters; (ii)

by making explicit the reference to justifiers, corresponding to elements of justification for asserting propositions. The first step allows us to introduce a local approach to the epistemic space, thus generalizing the standard global approach. The second step allows us to generalize the constructive approach according to which assertibility has to be intended as having a procedure to obtain a proof of a proposition.

As we will see, the resulting system is extremely powerful from an analytical point of view. In particular, within the system, it is possible both to provide an intuitive interpretation of the phenomena of para-completeness and para-consistency connected to rejection and to assume an intermediate standpoint on the problem as to whether rejection is to be intended as having a proof of the negation of a proposition or rather as not having a proof of the proposition.

Bjørn Jespersen (University of Barcelona)

Iterated Privation

What is the logic of iterated privation as expressed by, for instance, 'is a molten fake gun'? This talk motivates the thesis that the logic of iterated privation is a logic of contraries.

The received rule for privative modifiers replaces the modifier M_p by boolean negation:

$$[M_p\ F]_{wt}\ x$$

——————— *single privation*

$$\neg\ [F_{wt}\ x]$$

where F_{wt} is the extension of F at the ⟨*world*, *time*⟩ of evaluation. This rule fails to generalize to iterated privation. The suggested rule of iterated privation is this:

$[M_p\ [M_p'\ F]]_{wt}\ x$

——————— *iterated privation*

$[Non\ [M_p'\ F]]_{wt}\ x$

Non is the unique general privative modifier that takes a property *G* to the general contrary property [*Non G*]. Contrariety provides the weaker form of negation that is suitable for privatives. Some instances of iterated privation return the basic property *F*, others do not.

Tim Kraft (Universität Regensburg)

Conceptual Analysis, Necessary Conditions and the Distinction between Rejection and Denial

According to common philosophical methodology (dating back at least to Socrates), philosophical debates about some topic *F* should begin with clarifying what *F*s are before addressing more substantial questions including the question of whether *F*s actually exist or are even possible. For example, before debating whether knowledge, freedom of the will or universals possibly exist(s) we should agree on what knowledge, freedom of the will or universals are supposed to be. Alternatively, if full conceptual analyses are unavailable we should agree at least on necessary conditions for being an *F*. Again, to give examples, before debating whether freedom of the will is possible we should at least agree on whether the ability to do otherwise is a necessary condition on freedom and before debating whether knowledge is possible we should at least agree on whether infallibility is a necessary condition on knowledge. In a nutshell, debates about necessary conditions *precede* substantial debates, including existence/possibility debates.

This paper discusses a challenge to this common methodological assumption by focusing on what it means to say 'no' to a necessary condition. The challenge I have in mind runs as follows: Roughly, that condition *C* is necessary for being an *F* means that:

(NC) Necessarily for all x if Fx, then Cx.

Denying an instance of (NC), i.e. asserting the negation of an instance of (NC), entails that *F*s are at least possible. However, this is not how debates about necessary conditions are usually understood in philosophy. Since opposition to a necessary condition for being an *F* is rarely understood as a commitment to the possibility of *F*s, opposition to a necessary condition can't consist in denying an instance of (NC). For example, opposition to infallibilism

(IF) If *S* knows that *P*, it is impossible that *S* believes that *P* (on the same basis) and it's false that *P*.

Isn't taken to come with a commitment to anti-scepticism. It should be possible to say 'no' to infallibilism without being thereby committed to anti-scepticism, i..e., fallibilism and scepticism should be consistent. Thus, common philosophical methodology faces the

challenge to explain what opposition to a necessary condition is supposed to be if it's not denial.

To meet this challenge I discuss some proposals (labelled the 'verbal dispute account', the 'impossible worlds account' and the 'suspension of judgement account' in the paper) before presenting my own proposal. It consists in distinguishing between two negative doxastic attitudes, denial (= accepting the negation) and rejection (= negative attitude weaker than denial). According to this proposal, rejection of a necessary condition is a complex doxastic attitude consisting of, on the one hand, withholding belief on the possibility of *F*s and of, on the other hand, a conditional belief conditional on the possibility of *F*s (akin to, e.g., conditional promises). (Rejection is a complex attitude in the same way hope is, presumably, a complex propositional attitude consisting both of a pro-attitude and a doxastic attitude.) This proposal has at least two advantages: First, it doesn't require logical or semantic revision; it's consistent with classical logic. Second, it offers an explanation of why opposition to a necessary condition is stronger than mere non-acceptance or merely suspending judgement. Thus, it can explain common philosophical practice, for example, why fallibilists don't merely suspend judgement on (IF), but

indeed say 'no' to it. Finally, I also respond to two objections, namely, first, that my account of rejection is *ad hoc* and can't be turned into a general account of rejection and, second, that it's unnecessarily revisionary insofar as it postulates additional mental states.

Nils Kürbis (Birkbeck, London)

Bilateralist Detours: From Intutionist to Classical Logic and Back

The standard view is that adopting a primitive notion of denial in addition to a primitive notion of assertion, thereby doubling up pragmatic primitives in terms of which the contents of sentences is specified on the basis of speakers' use, allows for a neat justification of classical logic. Huw Price has proposed the position in order to answer Dummett's challenge of providing a satisfactory, use-based theory of sense that justifies classical logic. It has been developed into a formal theory, emulating Dummett's proof-theoretic semantics with its aim of a justification of deduction, by Ian Rumfitt. Price argues informally that there is no room between the assertion of a sentences and the denial of its negation, which would be needed for an

intuitionist concept of negation. Rumfitt develops a formal system of bilateral logic and argues that the rules governing classical negation in a bilateral logic are in harmony, where those for intuitionist negation are not.

I argue that, ironically, Price's account goes better with an intuitionist back ground logic. I regiment Price's account by formulating axioms that capture the concepts Price employs in his argument that bilateralism justifies classical logic. Price proposes a pragmatic account of belief in terms of the differences they make to speakers' actions. It turns out that the axioms entail consequences about the notion of making a difference that Price can't accept: if classical logic is correct, the notion is either vacuous or highly problematic. I show how a small modification insures that the notion of making a difference regains its interest. The theory is then, however, best seen as intuitionist, and classical logic cannot be established on the basis of it. Even if Price extended his account, this would only show that the classical and intuitionist alternatives are both available, and not what Price had intended to show, namely that his theory must be classical.

Rumfitt poses the intuitionist a challenge: to provide a bilateral account of intuitionist logic in which the rules of the system are in

harmony. I do exactly that and formalise an intuitionist bilateral logic where all connectives are governed by harmonious rules, showing Rumfitt's claim that only classical, but not intuitionist logic, can be justified bilaterally to be wrong. Thus Rumfitt's challenge is met. Harmonious rules for an intuitionist bilateral logic can be formulated by making fuller use than Rumfitt himself does of the possibilities offered by the formal framework of bilateral logics.

Thus Price's and Rumfitt's approaches both fail to justify classical logic as the unique logic. What is more, putting both together, I will argue that Price's informal account is captured by my formal system of bilateral intuitionist logic.

Finally, Price and Rumfitt agree that for methodological reasons, bilateralism is to be preferred over unilaterlism only if classical logic can be justified relative to it. As I show that intuitionist logic can equally be justified bilaterally, I conclude that the clumsy bilateralist approach has no methodological advantage over the simpler, more straightforward unilateralist approach.

Vittorio Morato (University of Padua)

Denials of Counterfactuals

According to D. Lewis (1973), would-counterfactuals ($\Box\!\!\rightarrow$) and might-counterfactuals ($\Diamond\!\!\rightarrow$) are duals:

(1) $\varphi \Box\!\!\rightarrow \psi \equiv \neg(\varphi \Diamond\!\!\rightarrow \neg\psi)$

From 1 (usually called "duality thesis") it follows that the negation of a would-counterfactual is the assertion of a might counterfactual with a negated consequent:

(2) $\neg(\varphi \Box\!\!\rightarrow \psi) \equiv \varphi \Diamond\!\!\rightarrow \neg\psi$

and the negation of a might-counterfactual is the assertion of a would-counterfactual with a negated consequent:

(3) $\neg(\varphi \Diamond\!\!\rightarrow \psi) \equiv \varphi \Box\!\!\rightarrow \neg\psi$.

The problem with 2 and 3 is that there seems to be perfectly plausible cases where I can both assert $\varphi \Box\!\!\rightarrow \psi$ and $\varphi \Diamond\!\!\rightarrow \neg\psi$ or $\varphi \Diamond\!\!\rightarrow \psi$ and $\varphi \Box\!\!\rightarrow \neg\psi$. For example, asserting a conditional like:

(4) If I would have arrived at the gate just 5 minutes later, I would have lost my connection flight to Boston

seems perfectly compatible with the assertion of the following might-not conditional:

(5) If I would have arrived at the gate 5 minutes later, I might not have lost my connection flight to Boston.

It is perfectly reasonable in fact that, while those five minutes actually secured my catching the connection flight, it is not the case that there were no possibilities for me to catch my connection flight and so, even arriving 5 minutes late, I might have, after all, been able to catch my connection and so I might not have lost it. But a might-not-counterfactual of the form $\varphi \diamond\!\!\rightarrow \neg\psi$ is predicted by 2 (and ultimately by the duality thesis) to be the negation of a counterfactual like $\varphi \Box\!\!\rightarrow \varphi$. Thus, standard Lewisian semantics seems to be giving us the wrong predictions about denials of counterfactuals.

Aim of my paper is to disentangle this situation. In particular, I will claim that a thesis like 1 misses the target in at least two ways. On the one hand, based on some considerations of R. Stalnaker (1984) and K. DeRose (1991), I will defend the view that might-counterfactual often receive an epistemic interpretation: in such cases, the assertion of a might-not counterfactual cannot act as the denial of a would-counterfactual in that the former asserts the compatibility of a certain would-counterfactual with the speaker's knowledge. On the other hand, I will defend the view that the way in which we deny counterfactuals is stronger than a simple sentential negation of a counterfactual. This latter claim will be connected with recent debates that treats negation as some kind of modality operator (such as Berto 2015).

References

Berto, F. (2015). A modality called negation. *Mind*, 124, 761–793.

DeRose, K. (1991). Epistemic possibilities. *Philosphical Review*, 100, 681–705.

Lewis, D. K. (1973). *Counterfactuals*. Oxford: Blackwell.

Stalnaker, R. (1984). *Inquiry*. The MIT Press.

Antonio Piccolomini d'Aragona (Aix-Marseille Université, Università "La Sapienza" di Roma)

Recognition procedures and Dag Prawitz's theory of grounds

According to a widespread proposal, the meaning of the logical constants should be explained through an epistemic notion accounting for evidence. The main development of such an idea, the BHK-semantics, dates back to the intuitionistic tradition. The burden is here put on proofs, generally coded by constructions of a typed and extended λ-calculus. Some authors have however questioned the BHK-clause for implication, namely the idea that a proof of $A \rightarrow B$ is an effective operation that always yields a proof of B whenever applied to a proof of A. An effective operation could in fact be highly complex, so that being in possession of it could amount to know how to obtain a proof from a proof, but not also to know that it behaves in the way required. In the first part of my talk, I will discuss the position of

Dag Prawitz on this topic; in the second, I will investigate some aspects of his approach within his recent theory of grounds.

Prawitz's proofs are endowed with functions denoting the recognition that evidence has been obtained. In the implicational case, the recognition must presuppose an understanding that an effective operation transforms proofs into proofs. For closed λ-calculi, this understanding is available and mechanical. Because of Gödel's theorems, anyway, no closed λ-calculus generates all the effective operations one needs. The linguistic context has then to be open, so that mechanical understandings are ruled out. Therefore, there remain only two options: either the understanding indicates case-by-case strategies, or it is a uniform – though non-mechanical – procedure. This leads to different ways to frame the question of whether every effective operation can be understood as transforming proofs into proofs. The case-by-case picture is reasonable, while arguments can be raised against the idea of a uniform procedure.

The theory of grounds involves a decidability problem that closely recalls these issues. Ground-terms are typed on formulae of a background language, and the question is now whether it is

decidable that an effective operation yields a ground of a specific type when applied to grounds in its domain. I will try to show that, from a ground-theoretic point of view, understanding procedures play the role of higher order operations. This is attained in three steps.

1. Prawitz's language of grounds $G(L)$ for a first-order background language L is introduced.

2. $G(L)$ is expanded via quantification over ground variables – which allows to formalize meta-formulae of the kind "the effective operation f always yields a ground of type B when applied to grounds of type $A_1, \ldots, A_n$".

3. A language of grounds $G(G(L))$ for the background language $G(L)$ is proposed, with terms typed on equations between ground-terms – which allows to take higher-order operations as constructions for the meta-formulae above.

Within this framework, it will also be possible to see that the epistemic problems posed by effective operations again lurk out in connection with higher order operations, and that the

understanding procedures always involve higher order operations to solve equations between ground-terms.

Giuseppe Primiero (Middlesex University, London)

Assertion by Trust. Negation by Untrust

Applications in computational domains complement verified knowledge with information sharing processes based on reputation models. From a logical viewpoint, formulating assertion operations in terms of a trust function is a great conceptual and technical challenge, as this is a fluid epistemic notion. Moreover, its complementary notion of untrust has a complex semantics, for which one needs to pin down the difference between distrust and mistrust. We overview a proof-theoretical approach to trust introduced in [Primiero, Raimondi (2014)] and applied to the problem of software management systems in [Boender, Primiero, Raimondi (2015)]. We extend here further its analysis to a notion of (un)trust based on a security protocol taking into account an intentional reading of data

and typing. We consider, moreover, the problem of untrust multiplication generating enemy mine situations.

References

J. Boender, G. Primiero, and Raimondi F. (2014). Minimizing transitive trust threats in software management systems. Technical report, Foundations of Computing Group, Middlesex University.

G. Primiero and F. Raimondi (2015). A typed natural deduction calculus to reason about secure trust. In Ali Miri, Urs Hengartner, Nen-Fu Huang, Audun Jøsang, Joaquin Garcia-Alfaro, editors, 2015 *Twelfth Annual International Conference on Privacy, Security and Trust,* Toronto, ON, Canada, July 23-24, 2014, pages 379–382. IEEE

Fabien Schang (National Research University, Higher School of Economics, Moscow)

Epistemic disagreements

I propose a formal framework for social epistemology, in which a number of various sorts of agents may obey alternative sets of acceptance and rejection conditions on sentences. The talk consists of two main parts.

After making a difference between information and justification, I propose two sorts of logical systems within a common dialogical framework $\mathbf{AR}_{m}^{n}$ of question-answer games. The first system, $\mathbf{AR}_4$, is a four-valued logic of information analogous to Belnap's **FDE**, with the notable exception that it includes a strong version of implication and depicts logical values as structured pairs of yes-no answers. The second system, $\mathbf{AR}_{4\blacksquare}$, is a logic of justification including at least four belief unary and truth-functional operators on justification sentences. A taxonomy of several kinds of agents is suggested, namely: rational, irrational, and intelligible agents. By this way, I construct a formal epistemology that develops some problem raised by Martin Kusch's works (on the relations between pluralism, skepticism, and relativism) whilst relying upon two fundamental data: yes-, and no-answers.

Then the notions of agreement and disagreement between agents are reviewed in the light of two basic concepts: negation, and opposition. On the one hand, the occurrence of partial or total (dis)agreements makes room for a distinction between (full) negation and two semi-negations. On the other hand, oppositions are then defined not as a relation between ontic truth-values but, rather, epistemic attitudes of agreement or disagreement. This results in a more fine-grained theory where any two agents can stand into different relations of opposition with respect to the same sentence. These ensuing, "non-standard" oppositions correspond to pairs ⟨X,Y⟩ of standard, Aristotelian oppositions X and Y.

To conclude, a number of philosophical applications will be exposed to make sense of such issues as partial or complete disagreement.

References

Costa-Leite, A. & Schang, F. "Une sémantique générale des croyances justifiées" (submitted)

Shramko, Y. & Wansing, H. "Entailment relations and/as truth values". *Bulletin of the Section of Logic*, Volume 36(2007), 131–143

Schang, F. "IF, and only IF" (draft)

Trafford, J. & Schang, F. "Is 'no' a force indicator? Yes, sooner or later!" (draft)

Wansing, H. "Contradiction and Contrariety. Priest on Negation". In Malinowski, J. & Pietruszczak, A. (eds.), *Poznan Studies in the Philosophy of the Sciences and the Humanities, Essays in Logic and Ontology*, 81-93

Martin Stokhof (ILLC - University of Amsterdam)

Assertion and Non-Discursive Content

The talk focusses on the phenomenon of non-discursive content, i.e., content that is ineffable, yet more than expressive; subjective, yet intersubjectively shareable; and world-related, yet action-guiding (and hence normative). We will give a brief sketch of a number of areas where such a notion of non-discursive content appears to play a role (aesthetics, religion, certainty). Then we will turn to the main issue, which is this: If non-discursive content really is "content", then it seems it must have some relationship with assertion. One reason to think so is this. To the extent that non-discursive content is action-

guiding it must have the ability to convince (to function in a decision-process, etc). At this point, it seems, there must be some kind of connection with assertion and assertive content. But then we are confronted with a number of difficult questions: What is the connection? Can we account for it without reducing non-discursive content to assertive content? Or can we only escape the threat of reduction by going expressivist, and thereby give up on the idea of non-discursive content? These are notoriously difficult problems, and we will certainly not be able to come up with definite solutions. But we want to explore this "Thin Red Line between Expressivism and Assertivism" a bit further and see what room there is to approach these issues in a non-reductive, positive manner.

James Trafford (UCA, London)

An Interactive Approach to Proof-Theoretic Semantics

In model-theoretic semantics for propositional logics, categoricity and compositionality are unproblematic whenever the semantics is truth-functional. This is not the case for proof-theoretic semantics,

where failures of both occur for the semantics determined by monological entailment structures for classical and intuitionistic logic. This is problematic for inferentialists, where the meaning of logical constants is supposed to be determined by their rules. Recent attempts to overcome these issues have primarily considered symmetric entailment structures, but these present difficulties for constructing a semantics based on proofs. Nonetheless, the reason that symmetric entailment structures overcome issues facing monological structures is, arguably, that they can refute problematic cases. This paper builds on this by considering entailment structures that combine provability with the dual notion of disproof (or refutation). This enables us to get proofs and counter-models (as refutations) on the same ground, as non-interdefinable, and forming a disjoint class. To do so, we effectively split the symmetric structure in two, formalizing a dialogue structure between the roles of prover and denier in a polarized form of bi-intuitionistic logic. We make this intuitive by considering a dialogical approach to proof and refutation. Arguably, the making of an assertion brings with it a commitment, not to its truth, but to defend its truth. That is to say, assertoric norms do not restrict what an agent ought to assert, rather they constrain how agents respond to challenge and dialogue. On this

view, making an assertion (we may think symmetrically for denial) is a matter of bringing that assertion into "play", at which point, it is subject to norms involving a commitment to its defense, to providing reasons for it, and allowing it to be "tested" through interaction with other reasons, counterexamples and so on. It is this interaction that will be shown to be constitutive of a proof-theoretic semantics capable of dealing with the above issues.

Luca Tranchini (Tübingen University)

Proof and refutations in bi-intuitionistic logic: A critical assessment

Whereas the meaning of logical constants in intuitionistic logic is understood in terms of proof-conditions, in dual-intuitionistic logic it is understood in terms of refutation-conditions. Likewise, logical consequence is analysed as transmission of provability in one case and as (backward-)trasmission of refutability in the other.

How can these two conceptions of meaning and consequence be brought together?

One may be tempted to answer that bi-intuitionistic logic offers the natural framework for the rejection of the transmission view of consequence in favour of a conception of consequence as a primitive and irreducible notion to which both proofs and refutations should be reduced as limit cases.

However, we argue that such a view is not tenable, at least if the resulting notions of proof and refutations aim at providing the basis for an anti-realist characterization of truth and falsity. The reason for this the fact that identity of proof (and of refutation) in bi-intuitionistic logic is trivial.

As an alternative we consider the possibility of bringing proofs and refutations together by using a strong negation operator. In particular, we show that strong negation allows one to simulate dual-intuitionistic refutations in the intuitionistic setting and, dually, intuitionistic proofs in the dual-intuitionistic setting.

Whether in this way proofs and refutations are really brought together is however doubtful. In fact, although either proofs or

refutations are mimicked by their duals, the two concepts are still not treated on a par.

I will conclude the talk by sketching a further possibility of bringing proofs and refutations together inspired by the translation of bi-intuitionistic logic in the richer linear logic setting. In particular, I will suggest that such an approach offers the prospects of overcoming the shortcomings of the previously considered attempts.

Pasi Valtonen (King's College)

The Meaning of Absurdity: A Comment on Murzi and Hjortland's Solution to Carnap's Problem

1 *Introduction*

The dispute between inferentialist and model-theoretic approach to meaning can be seen as dispute about the direction of explanation: Referentialism relies on the referential semantics which is then used to explain the inferential rules for the language. Whereas,

inferentialism starts off with inferential rules which are then used to explain semantics.

According to Panu Raatikainen, inferentialism cannot solve the so-called *Carnap's problem*, unlike its model-theoretic rival.

(NEG) ¬A is true ⇐⇒ A is false

is an essential principle for negation in both classical and intuitionistic logic. Carnap has shown a non-normal model which violates this principle: For any sentence A, both A and ¬A are true. According to Raatikainen, this valuation poses a serious problem for inferentialism: The standard rules of inference do not rule out the non-normal interpretation which violates NEG.

2 *Murzi and Hjortland's solution*

First, I examine Julien Murzi and Ole Thomassen Hjortland's (M&H from now on) solution in detail. In their reply to Raatikainen, M&H claim that *intuitionistic* inferentialists can handle the problem. Their claim rests on three assumptions: (i) Absurdity sign (⊥) stands for contradictory propositional content. (ii) The introduction rule for ⊥ is

null and the elimination rule is so-called *absurdity rule* which states that from ⊥ anything follows. Finally, (iii) their solution satisfies the harmony constraint. Briefly, the constraint says that the conditions for the introduction of ⊥ (or any other logical connective) must match the consequences when ⊥ (or any other connective) is eliminated. I demonstrate that the view faces a *dilemma*: Either Carnap's problem is solved but harmony of the rules for ⊥ is lost or harmony is saved at the cost of losing the solution to the problem.

My alternative proposal rests on relevantism. In contrast to M&H's view, relevantism does not attribute propositional content to ⊥. Rather, it sees ⊥ more like a punctuation sign, marking a dead-end in an inference. Viewed in this way, ⊥ has no introduction or elimination rules. Thus, harmony is not a question and relevantism escapes the dilemma presented above.

3 *Carnap's problem and Bilateralism*

M&H remain sceptical whether Ian Rumfitt's classical bilateralism can solve the problem. In the second part of the talk, I go on to show that the proposed view not only solves the exposed problems in the

intuitionistic solution but also contributes to the classical inferentialist solution.

Unlike unilateralism, bilateralism recognises in addition to assertion also an act of rejection. Given this, the bilateral introduction and elimination rules for negation yields the classical rule of the law of excluded middle *in a harmonious way*.

Contra M&H, it is my contention that Rumfitt's bilateralism can solve Carnap's problem with the help of so-called coordination principle. Briefly, let + A stand for assertion of A and – A for rejection of A, then the coordinated bilateral introduction and elimination rules allow to form

$$+ A, - A \vdash \bot \Leftrightarrows + A, + (\neg A) \vdash \bot.$$

which in effect rules out the situation where A is assertible and ¬A is assertible. Thus, the coordinated bilateral rules for negation do provide a solution to Carnap's problem. Furthermore, I show that the proposed solution is based on relevantism.

Heinrich Wansing (Ruhr-Universität, Bochum)

Negation, denial, and inference

In this talk I intend to discuss Frege's distinction between the content and the force of speech acts and what David Ripley (2011) has called denial equivalence, "the thesis that to assert the negation of a content *A* is equivalent, in its conversational effects and commitments carried, to denying *A*." Moreover, I will discuss Ian Rumfitt's (2000) bilateral conception of specifying the meaning (or sense) of sentences. Whilst I agree with Rumfitt that both conditions for affirming and conditions for denying are relevant for specifying the meaning of a sentence inferentially, I will criticize the use of formulas that are decorated with a force indicator. What is needed instead, I will argue, is a more general conception of logical inference that supplements verifiability with falsifiability, cf. (Wansing 2013, 2015). Both kinds of inference can come in a direct and an indirect version, thereby giving rise to different kinds of assertion and denial.

References

Ripley, D., 2001, "Negation, denial, and rejection", *Philosophy Compass*, 6: 622-629.

Rumfitt, I., 2000, ""Yes" and "No"", *Mind*, 109: 781-823.

Wansing, H., 2013, "Falsification, natural deduction, and bi-intuitionistic logic", *Journal of Logic and Computation*, published online July 2013, doi:10.1093/logcom/ext035.

Zhu Wei (Peking University)

On the Correspondence between Denial and Assertion in Belief Revision Context

In classical equivalence of denial, to deny a sentence 'p' is equivalent to asserting 'not p'. In belief revision context, on the one hand to make a denial can be treated as an operation that 'contracts' a belief proposition ('p', for example) from a set of beliefs ('A', for example), which represent the epistemic/mind state of an agent. On the other

hand, to make an assertion can be regarded an operation that 'expands' a set of beliefs by one more belief proposition. If the classical equivalence of denial held also in belief revision theory, then, we should probably admit that to deny belief 'p' by introducing 'not p' into the belief set 'A' is equivalent to exclude 'p' from the same belief set. However, in belief revision theory such an equivalence can hardly be accepted - or it is at least insufficient in order to properly understand the epistemic relationship between denial and assertion. In my presentation I would like to discuss why in the belief revision context the classical equivalence cannot hold and what other kind of systematic correspondence assertion and denial have.

List of Abstracts