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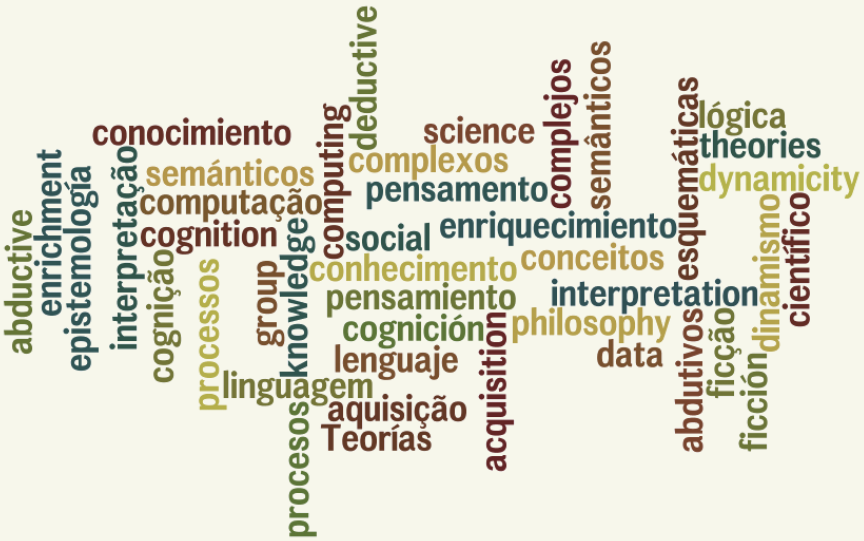

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Contents

Guess, Compute and Experience – On the Possibility of the Logic of Real Discovery

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Science is based on guessing, but how can there be guesses that are better than many others? Serendipity is precious in suggesting the means for the achievement of ends, such as action in the case of practical reasoning or hypotheses in the case of abduction, but it being a result of blind variation is doubtful. Notable scientific achievements are marked by a nearly instinctive bracketing of irrelevant alternatives. I argue that a significant element in discoveries lies in presenting data in diagrammatic forms, interpreted according to their structure and the perceptual images contained in them. Metaphors, also precious in real discovery, may express this association. Since learning costs, the process of presentation is itself guided by the strategic maxims of the economy of research. Association is a 'law of mind', and the so-called Baldwin Effect – tendency to learn general habits of behavior and for it to become a genetically inherited trait – of the recent, extended synthesis of evolutionary theory serves as a case against the consequentialist view that serendipity could be a naturalized form of variation and selective retention. This effect is what Peirce sought for in order to figure the logic of discovery at play in nature.

Indexicalized Knowledge

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My talk aims at providing additional support to the defense of epistemological contextualism, which relies upon an indexical interpretation of the knowledge predicate and for which the truth conditions of knowledge attributions exhibit a contextual variability in such a way that knowledge in one context does not entail knowledge in every context. One of the major challenges that contextualism is facing pertains to the clarification of the mechanisms at play in the indexical

interpretation of the knowledge predicate. Furthermore, if contextualism is to be contributive to epistemology, it must explain how epistemic contextual shifts are regulated. By means of a notion of epistemic context defined on the basis of the notion of context developed by McCarthy and Buvaˇc (1994, 1996) in artificial intelligence, I address these two challenges. I show how an indexical interpretation of the knowledge predicate can be formally modeled, and how the formal resources required to disambiguate the knowledge predicate and to regiment contextual shifting can shed new light on epistemological contextualism. In final analysis, an epistemological theory will be conceived as a set of epistemic contexts, each of which being characterized by an unique epistemic standard and a particular set of transposition rules (between contexts). In that perspective, epistemological contextualism will exhibit features of a kind of grammar for epistemological theories.

Controversias Y Espacios Controversiales En Filosofía De La Ciencia: Consideraciones Epistémicas
Controversies And Controversial Spaces In Philosophy Of Science: Epistemic Considerations

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En los últimos años se ha incrementado el reconocimiento del papel desempeñado por las controversias en la historia de la ciencia (Engelhart, 1987; Gil 1990; Machamer, Pera y Balta, 2000) y se ha llegado a propugnar que su análisis resultaría decisivo para superar graves limitaciones en la comprensión filosófica de su efectivo desarrollo (Dascal, 1995). Sin embargo, los propios intentos de delimitar la noción de "controversia científica" y su demarcación respecto a otros conceptos afines han conformado el campo de una nueva controversia. En este contexto, Oscar Nudler y colaboradores han propuesto una noción de nivel superior de análisis, la de "espacio controversial" (*controversial space)*, como un posible modelo de dinámica del cambio conceptual,

que vendría a superar la tradicional contraposición entre continuidad y ruptura en filosofía de la ciencia. Diversos ensayos de su posible aplicación a casos de cambio en diferentes ámbitos científicos han sido también elaborados (Nudler, 2004, 2009, 2011). El objetivo de este estudio se centra en un análisis de la estructura de esta propuesta teórica con especial atención a sus nociones de "foco" (*focus*), "terreno común" (*common ground*) y "refocalización" (*refocusing)*, valorando críticamente su grado de definición y su utilidad para la explicación dinámica del desarrollo científico.

The recognition of the role of controversies in History of Science has grown in the last few years (Engelhart, 1987; Gil 1990; Machamer, Pera and Balta, 2000). It has also been proposed that the analysis of this role would be decisive, in order to overcome serious limitations to the philosophical comprehension of its effective development (Dascal, 1995). However, attempts to delimit the notion of "scientific controversy" and its definition in respect to related concepts have established the ground for a new controversy. In this context, Oscar Nudler et al have proposed a notion of an analysis at a higher level, a "controversial space", as a potential model for the dynamics of the conceptual model. This model would overcome the traditional opposition between continuity and rupture in Philosophy of Science. Diverse essays of possible applications to cases of change in different scientific settings have been made (Nudler, 2004, 2009, 2011). The aim of this study focuses on the analysis of the structure of this theoretical proposal, with special attention to the notions of "focus", "common ground" and "refocusing", and a critical assessment of its degree of definition and its usefulness for the dynamic explanation of scientific development.

Reasons To Believe And Reasons To Not

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The provision of a precise treatment of the relation of evidential support – i.e. of providing a reason to believe–has arguably constituted the principal selling point of Bayesian modeling in contemporary formal epistemology and philosophy of science. By the same token, the lack of an

analogous proposal in so-called AGM belief revision theory is likely to have significantly contributed to the latter's relatively marginal status in the philosophical mainstream.

The present paper levels the playing field, offering within the AGM framework a novel suggestion regarding the relation between beliefs about evidential support and commitments to certain policies of belief change. This suggestion is spelled out in the following principle: (SUP) A rational agent is committed to the claim that A is a reason

to believe B, just in case, were she to remove the belief that B from her set of beliefs, and subsequently add A, the belief that B would be recovered in the process.

After noting various key formal properties of (SUP), the latter is then complemented with a related principle (UND) pertaining to the relation of so called evidential undermining–i.e. of providing a reason to not believe. The conjunction of (SUP) and (UND) is shown to dovetail elegantly with an important principle of iterated revision that is derivable from a number of widely-accepted assumptions.

The dynamics of conversation: fixing the force

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The interactionalist view of communication contends that the force of a speech act does not merely depend on the communicative intentions of a speaker, as the Gricean tradition defends. Instead, the recognition of the addressee is determinative of the illocution. This view is internally related to a normative conception of communication. Conversations are considered to be forms of joint action, in which the interactants jointly commit to the fact that a particular speech act has been performed. The minimal sequence in a conversation is analyzed as a three-steps one, with a first initiative move from the speaker, followed by the response of the addressee (recognition, rejection, or a new proposal), and finally a turn of validation or repair from the first interactant.

This point of view is commonly illustrated in the literature by means of simplified examples in which the addressee fails to recognize the communicative intentions of the speaker. My

aim is to analyze, from an interactionalist and normative point of view, an actual case of re-assignation of force to a public statement, in which the original intentions of the speaker where correctly identified but not accepted as determinative of the illocutionary force of his statement. This analysis can thus give support to the main contention of the interactionalist view. At the same time, it may allow us to identify some limits and constraints.

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A Teoria Adverbial da Predicação na Lógica Temporal

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Nas origens da Lógica Temporal contemporânea teve lugar um debate fundamental entre duas ontologias protagonizadas, respectivamente, por Prior e Quine.

No contexto do processo de constituição da semântica e da forma lógica do discurso temporal perguntava-se: como expressar a mudança? Segundo Prior, impunha-se a construção de uma linguagem na qual os indivíduos (*qua* substâncias) mudam no curso do tempo, não obstante a persistência da sua identidade própria (durabilismo). Para Quine, deveríamos optar pela linguagem estática do espaço-tempo que, inferida a partir da teoria da relatividade, postula a existência primordial de acontecimentos tomados como partes temporais de objectos-processos (perdurabilismo). Das diferentes opções até hoje tomadas, eis as formas lógicas alternativas:

[1] temporaliza-se o sujeito da predicação: F(*a-em-t*);
[2] temporaliza-se o predicado: *F-em-t*(a);

[3] concebe-se os predicados como relações diádicas entre tempos e objectos: R(a, t);
[4] temporaliza-se a função de predicação – [4.1] seja na forma da lógica proposicional modal: *T*(Fa); [4.2] seja através de uma modificação adverbial da cópula: a *é-t-mente* F.

Contra as críticas dirigidas, desde David Lewis, à teoria lógico-semântica temporal preconizada pelo durabilismo, argumentaremos no sentido de defender uma certa versão da teoria adverbial da predicação temporal, desenvolvida a partir dos trabalhos de Johnston, Lowe e Haslanger.

Universal attraction law and postulate of invariance of the velocity of light seen in Eurhythmic Physics

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Abstract: Brief presentation of Nonlinear Complex New Physics, the Eurhythmic Physics in the intuitive description of two fundamental concepts of Linear Physics. It will be seen that the Universal Attraction Law is a simple particular case of the Principle of Eurhythmy in general and in particular of the coalescence theorem. The invariance velocity postulate stands for the complex nonlinear nature of photons fundamental constituents of the light.

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Uma reinterpretação da Filosofia da Natureza de Hegel: a ideia de vida e de organismo como ponto de partida para uma abordagem evolucionista

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Neste trabalho proponho-me expor a *ideia de vida* em Hegel, a partir da *Ciência da Lógica* e da *Filosofia da Natureza*, conforme exposta na *Enciclopédia das Ciências Filosóficas*. Partindo da concepção de *vida* de Hegel, será investigado o modo como esta permite encontrar, no domínio da epistemologia evolutiva, um quadro conceptual para o questionamento de problemas da filosofia da biologia actuais.

Na demanda deste "entrecruzamento", será dada importância à noção de organismo e de sistema e às relações entre o organismo e o meio, a par de problemas respeitantes à relação do espírito com a natureza. Uma questão importante será acerca das concepções mecanicista, organicista e sistemática da natureza e da vida. É a vida algo mais do que as suas condições químicas e físicas? Qual o estatuto a atribuir à organização própria dos organismos vivos? Qual o significado do universal como espécie viva, e em que medida pode o pensamento biológico contribuir para a compreensão do próprio conceito de universal da filosofia?

Ao considerar a vida como princípio de significação, pode o vivente ser considerado apenas ao nível das relações mecânicas ou das relações abstractas, ou seja, como mero produto sobre o qual actuam forças mecânicas e/ou químicas?

Public announcements, belief expansion and abduction

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Abduction has been recognized as the most important problem of modern epistemology. In order to detect when an abductive problem has arisen, three parameters should be considered, namely, a background theory, a fact to be explained (in terms of such theory) and the inferential parameter, that is to say, the underlying logic used in the corresponding scientific practice. In our proposal the logical system is a basic KD45, then, according to abductive triggers, epistemic operations and belief closure of a theory Θ are defined: $\Theta'=\{B a\varphi : \varphi\in\Theta\}$ –where $Ba\varphi$ represents that the agent a believes φ–, and if $\psi\notin\Theta$, then $\neg Ba\psi\in\Theta'$. Then new operators could be defined: $[*\varphi]\psi$, after the expansion (or revision, or contraction) with φ, ψ holds. We also address the following matter. Suppose that ψ is a surprising fact and that the abductive expansion of the theory Θ to explain ψ is the expansion of Θ with φ. Then this is already guaranteed by $[*\varphi]\psi$ in Θ. In other words, the form of the theory makes the expansion easier.

Tinkering - Heuristic strategies of science research

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Citizen science projects are growing and open up the science practice. Public participation in scientific research comes in many forms, all of them dependent somehow on the internet and the *world wide web*. Through websites as *Foldit* or *CosmoQuest*, the user can collaborate in finding the best folding for a given protein or in building a more accurate map of the moon. A user-friendly approach appeals to the human interaction and depends on human reasoning. The user is a tinkerer, finds doubt and has to choose the best fit using the visual clues. This process emphasizes how Charles Sanders

Peirce concepts of abduction and diagrammatic reasoning are central to the heuristic strategies of today's science research.

A Version of Descriptivism on Natural Kind Terms

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This paper aims to propose a version of the description theory of reference – for short, descriptivism – on natural kind terms, which proves to be immune to the main objections from Kripke. This version is grounded on some proposals of descriptivists such as Searle and Strawson about proper names, which will be extended to natural kind terms.

According to Searle and Strawson the reference of a proper name is determined by a sufficient number of descriptions associated with the name. Among those descriptions are descriptions in which a speaker defers the reference of a term to other speakers. In this regard, descriptivism can accept Putnam's thesis of the division of linguistic labour and claim that some of the descriptions associated by non-experts have the function of deferring the reference of natural kind terms to their reference in the use by experts. Thus, descriptivism can maintain that the referent of a natural kind term, such as it is used by experts and hence also by the rest of the members of our linguistic community, is determined by a sufficient number of the descriptions that experts associate with the term.

Modified tableaux for some kinds of multimodal logics

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A multimodal logic is a logic where a certain number of different modal operators appears. In some of these logics we can have at our disposal a labeled tableaux method where different modal operators give rise to different labels. The

properties of the accessibility relations, in the semantic view, may be treated by means of what we call *inheritance rules*.

The easier cases are those in which all modal operators are of the same type, such as multiagent epistemic or doxastic logic. In these cases we can propose a modular tableau method that we can adapt to the most important systems only changing the inheritance rules. Although some of these systems give rise to infinite branches, we can avoid the infinity by means of some restrictions in the use of rules. More complicated cases require additional rules to deal with the relationship between different modal operators. Finally, some infinitary operators, such as *common knowledge* or *sometime in the future*, may be treated using DB-tableaux or recursive rules.

The Nexus of Principles and Models in the Semantic View of Scientific Theories

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This investigation considers Ronald Giere's Model-Based view of theories (MOT). Giere's propositions and theories are examined in terms of the author's own conceptualisation of MOT. This investigation conceptualises the nexus between principles and representational models. It emphasises that the dynamics, respectively sequence, of scientific theories, could be based on this nexus.

Summary:

1. The basic elements of theory are models serving as vehicles of principles.
2. Models are decisive in constructing theory.
3. The articulation of principles (in models) brings new knowledge that does not inhere in the principles themselves.
4. The acceptance of principles depends on the acceptance of a commensurate set of models.
5. New theories emerge when the set of models convince the scientific community that this set supports the new principles.

Algunos problemas del modelo explicativo en una investigación detectivesca

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Un modelo organizativo que pretende evolucionar hasta ser explicativo en una investigación detectivesca (real o de ficción) no es un modelo abstracto sino empírico. De ello se desprenden una serie de problemas que afectan a su construcción. El primer problema es el valor de verdad que vamos a asignar a sus proposiciones básicas. Junto a evidencias directas tendremos testimonios con mayor o menor grado de credibilidad, cuya estipulación será vital cuando se produzcan aparentes contradicciones entre ellos. El segundo problema emparentado con el primero es que, muy al contrario de lo que ocurre en una investigación de ciencia natural, tropezamos con otro modelo que se nos entrecruza, una estructura estratégica destinada a confundir creada por el asesino, y que en caso de que éste conozca el desarrollo de la investigación se realimenta y cambia. Nos encontramos con una especie de ajedrez; es decir, con una estructura básica de juego con contrincante.

La información como concepto clave en las Ciencias

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En este trabajo se plantean distintas aproximaciones y problemas relativos al concepto de información. La información como idea omnipresente en Epistemología (en la formal y también en la filosófica) y en las Ciencias (desde la Lógica hasta la Biología) es generada, transferida, interpretada y utilizada aunque es difícil esperar que una simple conceptualización de la idea de información satisfaga las necesidades de campos tan diferentes como son el de la transmisión de señales eléctricas o como el de la economía o el de la lógica. Con este trabajo no se pretende una unificación del concepto de información valido para toda disciplina sino la integración en la medida de lo posible de estas aproximaciones. El trabajo parte de una noción de

información basado en el concepto de dato, donde se comienza explorando la definición y el lenguaje básico de los datos y su representación, recorre la teoría matemática de Shannon centrándose en su evaluación epistemológica, se detiene en la concepción semántica donde el análisis intenta dar cuenta de ideas como la de significado y veracidad de la información, explora la dimensión lógica donde se capturan ideas sobre la estática y la dinámica de la información mediante distintos sistemas formales y finalmente da una perspectiva de otros enfoques, no menos importantes, como pueden ser el biológico (la información desde el punto de vista de la genética y de la neurotransmisión), el de la Física (la información y la idea de energía de un sistema) y el de la Economía (conceptos relacionados con la información de los agentes en teoría de juegos).

Abducción selectiva

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Uno de los problemas que la literatura sobre abducción menciona con frecuencia es el crecimiento exponencial de las posibles soluciones a un problema abductivo. La abducción puede verse, en manos de los expertos en AI y programación lógica, como una estrategia de resolución de problemas. No obstante, la inferencia abductiva se menciona a menudo como uno de los recursos cognitivos que empleamos los humanos. La abducción puede verse, pues, como un procedimiento que infiere relaciones de compatibilidad –por emplear un término neutro– puramente formales, pero también como un elemento básico en nuestro arsenal cognitivo. Se trata, en fin, un procedimiento de generación de creencias, cuya función prioritaria es ayudar al sujeto a orientarse en el mundo, como ocurre con la inferencia inductiva, y cuya especificidad reside en que el razonamiento está guiado por consideraciones explicativas. Visto así, parece imprescindible elaborar criterios que permitan seleccionar de entre las explicaciones potenciales. No en vano algunos autores han empleado la expresión "abducción selectiva" (v. Magnani, 2000; Schurz, 2008).

El objetivo de mi exposición es analizar los factores que pueden dirigir este proceso selectivo, aquellos que componen lo que podríamos llamar "bondad explicativa", y dar algunas

sugerencias sobre cómo abordarlos desde un marco probabilístico. Dicho marco posee la ventaja, a mi juicio, de subsumir los contextos donde la conexión entre la evidencia (el explanandum) y la hipótesis explicativa H es deductiva como un caso particular en el que p (explanandum | H) = 1.

En relación a los criterios que hacen preferible a una explicación frente a otra distingo una doble dimensión: local y general. Así, por un lado cabe considerar la relación que el explanans mantiene con el explanandum, y esta sería la dimensión "local"; por otro, ciertas cualidades del propio explanans que son independientes de la relación concreta que mantenga con ese explanandum en particular.

Respecto a los criterios locales, pensamos que A (explanans) es mejor explicación de a (explanandum) cuanto más probable resulta a dando A por supuesto. Esto tiene que ver con el sentido intuitivo, peirceano, según el cual la abducción reduce la sensación de incertidumbre. Un buen modo de reflejar este factor es mediante la noción probabilística de verosimilitud [p (explanandum | H)]. Sin embargo, en mi opinión este es un componente crucial pero no el único. Hay casos notables donde una alta verosimilitud va acompañada de un bajo valor explicativo. El ejemplo más obvio aquí son las hipótesis ad-hoc explícitamente diseñas para encajar perfectamente con la evidencia, pero con un valor explicativo mínimo. Esta es la razón por la que considero que las medidas recientemente propuestas de "valor explicativo" (Schupbach y Sprenger, 2011; Crupi y Tentori, 2012) no agotan este sentido "local" de calidad explicativa.

Mi sugerencia aquí es considerar la capacidad de acomodación de la evidencia por parte de la hipótesis explicativa como un factor adicional a tener en cuenta. La capacidad de acomodar la evidencia de modo indiscriminado es lo que subyace a muchas maniobras ad-hoc, en mi opinión. De esta forma se excluyen casos que no deberían contar como buenas explicaciones ni siquiera en sentido local.

Respecto a los criterios generales, cabe considerar: la simplicidad, la capacidad unificadora, y la coherencia con el cuerpo de conocimientos aceptado. No es posible abordar todos ellos en esta charla, aunque sí exploraré la posibilidad de entender el último según la noción de "coherencia explicativa" desarrollada en Olsson (2002).

Para concluir, difícilmente podríamos considerar a la abducción como un mecanismo inferencial útil para nosotros si las creencias formadas mediante esta estrategia cognitiva fueran manifiestamente erróneas. La legitimidad epistémica de dicho procedimiento exige, pues, que, en general, proporcione creencias verdaderas o altamente probables. Esto emparenta la noción de abducción con la "inferencia a la mejor explicación". Acabaré mi exposición valorando si las propuestas concretas que he sugerido respecto a los criterios de selección apuntan en la dirección verdad/alta probabilidad.

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Belief revision revisited

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Alchourrón, Gärdenfors, and Makinson presented, in 1985, an axiomatic account to belief revision which - under the acronym AGM – dominated the discussion of belief revision up to today. The abstract nature of the approach - which, methodologically, can be considered as an example of Hilbert's famous Axiomatic Method - shifts, however, the syntactic perspective immediately to the investigation of semantic structures which may fulfill these axioms.

In this talk, we will turn back to a purely syntactic approach to belief revision which critically reviews AGM. It is based on the assumption that new information is processed locally in a derivation structure. Such new information may "flag" certain contradictory previous beliefs without revising them. A full belief revision might be triggered only when a certain amount of flags was hoisted. In this view, belief revision features some structural parallelism to Kuhn's famous concept of scientific revolution.

Questões De Representação e De Nomenclatura De Isómeros Ópticos

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A designação *isómero óptico* pode servir de ponto de partida para uma discussão sobre questões de representação e de nomenclatura em química. Isómero é um neologismo cunhado por Berzelius em 1830 para designar compostos químicos com fórmulas moleculares iguais, mas com diferentes fórmulas estruturais. Quanto ao qualificativo *óptico* o significado, na verdade, não é o corrente, mas refere-se à sua *actividade óptica*, propriedade relacionada com a acção sobre a luz polarizada. Os isómeros ópticos, também chamados *estereoisómeros* ópticos, para acentuar o carácter espacial deste tipo de isomeria, existem com frequência em moléculas assimétricas, não sobreponíveis com as suas imagens num espelho, como uma mão humana, o que originou a designação de moléculas *quirais*. Exemplos de moléculas assimétricas são os aminoácidos naturais, açucares, muitas hormonas, etc.

A nomenclatura destas moléculas, que traduzia inicialmente apenas a diferença de actividade óptica, passou a corresponder ao arranjo espacial dos átomos, recorrendo a uma linguagem extremamente codificada. Também a representação bidimensional de estereoisómeros tem recorrido a convenções várias para visualização de modelos tridimensionais.

Nesta comunicação pretende-se tentar ilustrar aspectos de linguagem e de representação nesta área muito importante

da química, dado a isomeria óptica ser uma propriedade vital no funcionamento e até na existência de organismos vivos.

Modal Reasoning and Implicit Contextual Constraints

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In formal logic, a perfectly valid argument may be used to devise a fallacy by attributing an ambiguous meaning to one of the objects or relations, in such a way that the purported conclusion means something different than what was implied by the premises. A subtle variation of this type of fallacy may be found in modal reasoning, where a result calculated with probabilities, for example, involves a range of possible worlds or outcomes which is usually determined implicitly by the context. A variation of these implicit constraints in an otherwise _awless argument is what gives rise to a modal fallacy. After a few simple illustrative examples, this paper will diagnose a real- world argument that advocates the supersession of classical logic with a new quantum logic. The conclusion will be shown to be based on a modal fallacy.

Examining the Plausible Side-Effects of Abduction

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In the context of abduction in logic, whenever discovering abductive explanations for some given primary observation, one may wish to check too whether some other given additional secondary observations are true, as a logical consequence of the abductive explanations found for the primary observation. In other words, whether the secondary observations are plausible in the abductive context of the primary one, a common scientific reasoning task.

Thus, one may want to find abductive explanations for such secondary observations strictly within the context of the abductive explanations found for the primary observation, namely disallowing new abductions for explaining them. And even to do so without having to produce a complete model.

As it were, the explanations of such observational consequences may just consume, but not produce, the abduced atoms of the abductive justifications for the primary observation.

We show this type of reasoning requires a new abduction concept and mechanism, that of "contextual abduction". Moreover, we examine and formalize its variants, including its use in expressing counterfactual reasoning.

We illustrate, by means of examples, how one can employ these concepts to investigate plausible side-effects of interest (the inspection points) in order to help choose among abductive solutions.

Procesos de reducción y estructuras argumentativas en el análisis. Estudio de un caso paradigmático”

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En el presente trabajo estudiaremos, apoyados en algunas de las ideas discutidas por Grosholz en *Representation and productive ambiguity in mathematics and the sciences* (2007), la noción de “reducción” en el contexto del análisis entendido como “resolución de problemas”.

La idea de análisis y la de reducción se encuentran, como destaca Carlo Cellucci, estrechamente relacionadas. En este sentido, en "The Growth of Mathematical Knowledge: An Open World View", Cellucci escribe:

[The] analytic method (...) essentially consists in solving a problem by reducing it to another one, which is provisionally assumed as a hypothesis and shown to be adequate to solve that problem (Cellucci 2000, p. 9).

A partir de esta caracterización del "método analítico", discutiremos el procedimiento de reducción a la luz del estudio de un caso extraído de la historia de las ciencias formales, a saber, la resolución del clásico problema de la cuadratura del círculo propuesta por Leibniz en *De Quadratura Arithmetica Circuli Ellipseos et Hyperbolae Cujus Corollarium est Trigonometria Sine Tabulis* (GM V, 1675/1676). A partir del estudio de este caso será posible precisar las diversas estructuras argumentativas involucradas en el proceso de reducción que nos interesa esclarecer.

La reducción de un problema a otro consiste en una estrategia que permite buscar la solución de un problema complejo a partir de la solución de un problema más simple y a modo de aproximación, en el cual estarán contenidas las condiciones de resolución del problema originalmente planteado. Para la construcción del nuevo problema – de cuya solución va a depender la solución del problema original – será preciso reorganizar parte de la información contenida en el problema inicial así como elaborar nuevas representaciones recurriendo a distintos tipos de inferencias (e. g., abductivas, analógicas, inductivas etc.).

A la luz de estas consideraciones centraremos nuestra atención en el estudio del método empleado por Leibniz que permitirá reducir el problema del cálculo del área del círculo al problema del cálculo del área de una curva cuyo valor pueda ser efectivamente expresado; nos referimos aquí al denominado "método de transmutación" en el que identificaremos tres momentos fundamentales del proceso de reducción:

a) En primer lugar, la "armonización" del ámbito de lo infinitesimal con el ámbito de lo finito. Esto se lleva a cabo por medio del "triángulo característico", cuya configuración permite establecer una relación entre un

triangulo que se "postula" como infinitamente pequeño (o "tan pequeño como se desee") y un triángulo finito semejante por medio de una tangente a la curva (el círculo, en este caso).

b) En segundo lugar, se establece una relación racional entre dos figuras, el triángulo y el rectángulo; aquí se vinculan distintos planos o niveles a fin de "armonizar" objetos diferentes: el triángulo será entendido como un rectángulo cuyas ordenadas se encuentran en un punto en el infinito.

c) Por último, de las instancias precedentes se "construye" una nueva representación del problema; se trata de una curva equivalente a la primera que permite "aproximar" una solución al problema bajo consideración. La relación establecida entre el problema original y el problema a resolver en esta última instancia consiste en el pasaje de una curva cuya ecuación contiene cantidades intratables o irracionales a otra que puede ser expresada con series infinitas de números racionales.

Defeasible argumentation in african oral traditions. A special case of dealing with the non-monotonic inference in a dialogical framework

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The argumentation procedures in African oral traditions are carried out in a defeasible mode, where certain type of propositions (proverbial ones) plays a special role in the arguments' corpus. The proverbial sentences work both as primitive propositions (into the traditional epistemological system) and also as a kind of inference rules which are non-strict.

Indeed, from the cultural background of negro-oral traditions, proverbial sentences are thought as conveying some pieces of knowledge meanwhile they represent some canonical norms of rationality. And, in the set of premises of any argument, proverbs play a very important role given that the derivation of conclusion depends on the relevance in the use

of the proverbial premise. Practically, on takes any set of premises – expressing some state of affairs – to which one adds a strategic premise (proverb). Typically, this later is a generic image for a class of facts. If one may establish a plausible analogy between the effective situation at stake with the symbolic image represented by the proverb used in instance, then a defendable conclusion is relevantly derived.

The point here is that, this kind of argument can be challenged and sometimes defeated by another which is contesting the former. In the challenging phase, the opponent first agrees with the premises of his adversary, but he adds an extra premise which is another proverb too, for blocking the relevance of the ancient proverb working for the precedent argument. This often happens when people are debating about different questions of law or of interpersonal relations. And the root of defeasibility – from a methodological view – is the non-strcitedness of the inference rule used for deriving conclusions (that is the proverbial sentence is not a strict inference rule).

Now, for the purposes of modeling this argumentation's defeasibility we need a suitable formal system and technical tools. Not only one has to capture the dynamic of inference through the non-monotonicity of inference used into this argumentative mode, but also the important role of the configuration of the polemical and rational debate. For this aim, it appears that some fragment of theory change (belief revision) will allow us to manage the challenging process in the argumentation form considered here. For, the addition of an extra premise (a counter-proverb) in the set of premises of an argument by the opponent, is as if to force a revision on this set of premises. Moreover, the counter proverb aims to block the relevance of the ancient one, formally that means that causes a contraction of this ancient proverb. So, we take the revision and contraction operators as tools useful for our modeling work. However, given that the argumentative defeasibility can only take place when there are contesting exchanges, we naturally consider the dialogical framework as a suitable system and a relevant methodological approach.

Thus the dialogical logic will be revised for welcoming the new connectives (those of theory change), what induces the introduction of some new particle and structural rules into the dialogic.

Semantic Epistemicism, The Sorites And The Liar

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Horwich defends an epistemic account of vagueness that wants to preserve the Law of Excluded Middle (which is seen as a basic law of thought) and, consequently, claims Horwich, the Principle of Bivalence. He defends, thus, that vague predicates have sharp boundaries which we are not capable of knowing. Armour-Garb and JC Beall present what they call 'Semantic Epistemicism' (SE), an application of Horwich's account of vagueness to the Liar paradox within the frame of Minimalism; according to SE the Liar is either true or false, but we cannot know its truth value; in this sense, says Horwich, the Liar is (epistemically) indeterminate. I want to argue, first, that Horwich is really committed to SE (he has admitted that to me in conversation) and that SE can be claimed to be a common solution to the Liar and the Sorites paradoxes. Second, I defend Horwich's point of view from some criticisms raised by JC Beall, specially one related to the paradox of the Knower. Finally, I present my own worries about Horwich's solution to the Liar; such worries are mainly related to the contingent Liar, specially Liar-kind sentences created using other (epistemically) indeterminate sentences.

O dualismo onda-corpúsculo e o valor da teoria científica em Bohr. A necessária consideração da dialéctica materialista.

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O desenvolvimento da ciência no século XX colocou aos físicos novos desafios. As ondas revelavam um comportamento corpuscular e as partículas comportamento ondulatório. Mas nunca simultaneamente. Essa dificuldade levou Bohr a adoptar a complementaridade que aparece como a figura através da qual a contradição entre onda e corpúsculo se vê fixada. A oposição entre onda e corpúsculo, que se revelava agora relativa, foi absolutizada. A não

consideração da dialéctica impediu que Bohr avançasse no sentido da resolução daquela contradição objectiva que ameaçava reflectir-se na teoria.

Como consequência, é a realidade objectiva, na sua unidade e como uma totalidade contraditória, que se vê despedida da teoria. O ser é tomado como uma soma de determinações. A teoria científica desiste de procurar a conexão interna dos fenómenos e a sua tarefa passa a ser a sua ordenação. A objectividade passa a ser interna à linguagem e transforma-se numa intersubjectividade. De facto, Bohr, ao colocar a correlação entre objecto e instrumento de medida (ao fazer depender o fenómeno da experiência, da prática humana) como a instância em que o conhecimento se funda, está a negar a possibilidade de um conteúdo das representações humanas que não depende do sujeito, está a negar a verdade objectiva.

Computación Inteligente Con Organismos Vivos

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La capacidad de las células para realizar cálculos (procesar información) es muy superior a la potencia de cálculo de cualquier ordenador que pueda ser construido algún día con una tecnología electrónica perfecta. Se trata de presentar máquinas moleculares (basadas en la manipulación de moléculas de ADN) y máquinas celulares (inspiradas en el funcionamiento de las células eucariotas) a través de un marco formal, como alternativas posibles a las limitaciones inherentes a las máquinas electrónicas de propósito general.

A logic of Assertibility and Deniability

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This paper will present an investigation of entailment viewed as a relation, which preserves assertibility in contexts rather than truth in worlds. This approach is inspired by

Christopher Gauker but in the talk his original theory (see Gauker, 2005) will be modified dramatically. First, Gauker's concept of context will be replaced by that of Stalnaker; i. e. by contexts we will mean simply sets of possible worlds (see e.g. Stalnaker, 1999). Second, Gauker's treatment of disjunction will be replaced by a more "constructive", intuitionistic-like treatment. We will see that this has some serious technical consequences. Third, the condition for denial of conditionals will be captured in a way which was identified e.g. by Paul Grice (see Grice, 1991, p. 80). These modifications result in semantics which will be called LAD (logic of assertibility and deniability). The lecture will consist of three parts. In the first part, informal motivation will be given. In the second part, LAD will be defined and it will be shown that the semantics has some elegant technical properties. Moreover, a complete natural deduction system for LAD will be formulated. In the third part, LAD will be applied and used as a tool for explaining some natural linguistic phenomena.

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Por un enfoque artefactual de la modelización en ciencia

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En nuestros días son cada vez más numerosos los enfoques filosóficos que entienden la ciencia como una actividad que se propone representar partes del mundo con la ayuda de modelos científicos. Sin embargo, resulta difícil responder a la pregunta de qué es un modelo (dar un criterio de identidad) dada la pluralidad de connotaciones con las cuales se utiliza el término en las diferentes disciplinas. En efecto, en la práctica científica se llama tanto *modelo* a estructuras

matemáticas como a representaciones ideales o abstractas u objetos concretos de la vida cotidiana. En nuestro trabajo propondremos un criterio de identidad para modelos abstractos a partir de la teoría artefactual de Amie Thomasson tal y como ha sido capturada en el enfoque lúdico del pragmatismo dialógico. A partir de este discernimiento propondremos una ordenación para modelos centrado en las nociones de dependencia y creación.

Que metafísica elimina Carnap?

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Segundo Carnap, o problema da metafísica reside no facto de pretender fazer-se passar por aquilo que não é: conhecimento. Uma vez que, segundo Carnap, o verdadeiro conhecimento é o científico, há que eliminar as pseudo-proposições metafísicas da ciência. Nesta apresentação procuraremos mostrar que essa pretensa eliminação da metafísica por parte de Carnap traz consigo dois problemas maiores: por um lado, abrange também parte da ciência; por outro lado, atinge apenas uma certa concepção de metafísica.

Models And Incompatibility In Theoretical Physics.
The issue of realism in the methodology of science

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Theoretical models play a fundamental role in the methodology of theoretical physics. There is no branch in contemporary physics, whether it is cosmology, astrophysics or microphysics, where models are not used.

Theoretical models are idealized constructs about a single phenomenon or about a limited empirical domain. They are intended to both save the phenomena and to make testable predictions about the domain they are concerned with. Thus models are not susceptible to being true or verisimilar

representations of certain aspects of reality. This is a point at which I disagree with realist philosophers of science.

Models make use of extant theories and are of particular use in domains lacking theories. Moreover, in a historical sequence of theoretical models about a certain domain not every model is compatible with previous ones. This is the case of Ptolemaic and Copernican cosmological models or of Einsteinian and Newtonian gravitational models. The existence of incompatibility among models (and even theories) about the same domain is the most serious issue standard convergent realism is faced with. In order to illustrate this situation I am going to analyze the different kinds of theoretical models contemporary nuclear physics makes use of.

Knowledge in Diagnosing Contexts

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Traditional epistemic contextualists maintain that what shifts from one context to the next is the level of justification sufficient for knowledge, broadly construed. This model, however, does not accommodate judgments about knowledge in environments in which expert counsel is sought. Such contexts, I argue, do not merely elevate the standard of justification required for knowledge, but in fact introduces a new component: the subject's cognitive competence to discern connections between the target proposition and other statements in the relevant field, which both explain the truth of the proposition and provide some guidance for future action. Here, I examine one species of such environments, namely, diagnosing contexts.

Functions, predicates, concepts and the argument structure of the sentence

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The old problem of how meanings are combined to yield more complex meanings has been solved by different logical and grammatical models in different ways, too. The first

proposals attempting to explain the inseparable relationship between syntax and semantics can be found in categorial grammars at early twentieth century, from the idea of a combination of meanings appeared in Husserl's logic. The research line of categorial grammar was discredited in the 50s of the last century by Yehoshua Bar-Hillel, to be revived in the seventies, with the help of Richard Montague. On the other side, Chomsky's generative grammar took the place left by categorial grammar in projects about machine translation and language formalization, developed since the 60s to the 80s, but mostly focusing their interest in syntax. The concept of an argument structure of the sentences to explain the connection between syntax and interpretation of natural language statements gives us the ability to reconcile both grammatical models: the generative and the categorial ones.

Abducción en el retículo de los sistemas normales de la Lógica Modal Proposicional

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El trabajo comienza presentando la nociones de abducción ordinaria (o abducción estándar) y abducción estructural –esta última expuesta por primera vez por L. Keiff en 2007 y luego desarrollada, entre otros, por A. Nepomuceno y F. Soler–, indicando los pre-requisitos de cada una de ellas así como los paralelismos y las diferencias entre ambas. Se pasa al estudio de la abducción estructural en el caso particular de espacios de soluciones que estén parcialmente ordenados por la relación "ser subsistema lógico de" (según la cual, dado un par de sistemas coincidentes en el alfabeto y la sintaxis de su lenguaje, así como en su semántica, difieren en sus respectivos cálculos, siendo uno de ellos un subconjunto del otro). El trabajo prosigue con el estudio detallado de las cuestiones antes expuestas para el caso particular de los quince sistemas normales de Lógica Proposicional Modal Alética existentes, conjunto que tiene estructura de retículo con la relación citada. Finalmente se presentan los resultados obtenidos en la generación de todas las soluciones estructurales posibles dentro del espacio de búsqueda mencionado mediante la implementación de la abducción estructural en un demostrador automático que ha sido programado en Prolog. Como colofón se ilustran las

aplicaciones que estos planteamientos teóricos y su implementación pueden tener en diversas áreas de estudio del ámbito filosófico, especialmente en la Metafísica Computacional –en el sentido de los trabajos de, entre otros investigadores, Ed Zalta–.

Cinco Palavras Para Compreender Poincaré: Geometria, Caos, Simetria, Princípios, Convencionalismo

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A contribuição de Henri Poincaré para a filosofia das ciências pode ser caracterizada a partir de algumas palavras, fundamentais no seu percurso de cientista e de filósofo. Algumas delas, tais como *Geometria ou Convencionalismo*, adquiriram novos sentidos com a sua obra. O termo *Caos*, embora inventado muito depois do seu tempo, tem origem nas suas descobertas. Os *Princípios* da Física assumiram sentidos inesperados através das suas reflexões. E finalmente a palavra *Simetria* traduz profundas transformações na física, com origem no seu estudo da eletrodinâmica.

Nesta comunicação procura-se pôr em evidência as virtualidades destas cinco palavras na descrição dos aspetos matemáticos, físicos e epistemológicos do pensamento de Poincaré. Uma das características fundamentais da sua obra – o cruzamento de saberes – será ilustrada também com recurso às mesmas cinco palavras.

Fictions in Legal Science: The strange case of the Basic Norm

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If the presence of fiction in natural sciences is sufficiently known and accepted, the same doesn't seem to happen when it comes to legal science. The presence of fictions in Law is

unquestioned and can be traced since Roman law, but its legitimacy remains a matter of great divergence among critics. The problems surrounding the presence of fictions in the legal field gave rise to a strange paradox: when the judge makes use of a legal fiction, he's not actually applying the Law, and yet the use of this linguistic artifact seems to play its role very well, since the legal consequences that were searched were all finely attained by the use of fiction.

Our aim is to analyze this paradox under the light of the legal theory proposed by Hans Kelsen and his proposal that the very basis of the whole positive legal system lies on a fiction, called the Basic Norm. The difference is that this "norm" must here be seen as a methodological principle, a scientific tool. We'll try to explain how a fiction can display such an important function and still preserve the "principle of purity" of the kelsenian legal theory.

Action Models for the Extended Mind

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Abstract: Logic has a relevant role in many cognitivist theories by authors like Fodor. Representational theories of mind have space for logical inference. But current trends in cognitivism attend to new topics, as the relevance of the environment in cognitive tasks. The idea of the extended mind focus on the importance of external resources that can be considered as part of the mind. It seems that logic has nothing to say in these theories. But new advances in dynamic epistemic logic provide tools that allow us to model some of the operations that a cognitive agent makes when interacting with the environment. We do not claim that all aspects of the extended mind thesis can be caught by logical formalisms. But a logical analysis of the epistemic actions related with the cognitive configuration and exploitation of the environment throws light on the novelties of the externalist approaches.

The pitfalls of deontic logic

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The founding father of deontic logic G.H. von Wright noted in the early 90s, that the branch of logic that originated, in its modern version, about forty years ago, "has remained something of a problem child in the family of logical theories". Unfortunately, the realm of logical theories subsumed under the term "deontic logic" has kept its somewhat problematic reputation up to now.

In my paper I argue that while searching for a remedy of the unfortunate state we should pay special attention to proper parceling out of the realm. I propose a parceling that makes use of David Lewis' conception of scorekeeping in normative language games. I distinguish six alternative approaches to deontic logic. They differ a) in their focus on different kinds of moves in the language game, b) in their conceiving the language game either as static or as dynamic, c) in their explanatory ambitions. I suggest that if we carefully avoid crossbreeding of the approaches we can expect from logic more adequate representation of different kinds of normative situations and a deeper insight into their nature. I will support this claim with several examples.

The discovery of Kepler's ellipse: Peirce's abduction model revisited

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Peirce presented abduction as the logic of discovery and his paradigmatic example of abduction reasoning is Kepler's discovery of Mars' orbit. But it took Kepler ten years to make the discovery, why did take him so long? And was abduction the only reasoning at work in the process? Looking back at the history of the discovery, it looks indeed as if its various stages follow a logical pattern of which Peirce seems to have captured only the last. After briefly surveying the main stages of Kepler's discovery, I will show the importance of the epistemic attitude that explains its time span and argue that

it should be included as an integral part of the whole process to provide a satisfactory formalisation of the discovery.

Algebraic Closure, Unification, and Understanding

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My concern, in this paper, is to explain away the logical inconsistency of the following three claims, which are separately endorsed by various mathematicians and philosophers of mathematics: (a) Mathematicians are, and should be, looking for understanding. (b) Model completeness provides understanding. (c) Mathematicians should avoid model completeness. The notion of understanding that I have in mind is that which expresses the epistemic state one is in when one can see why, rather than merely that, a theorem is true. The notion of model completeness is defined as usual: a theory T in a first order language is model complete if and only if for any models A, B of T, every system of polynomials over A which has a solution in B also has a solution in A, i.e., every model of T is an existentially closed model. Assuming claim (a) to be unproblematic, I analyze claim (b) and show that one alleged epistemic provision of model completeness is unification. Then I evaluate claim (c) and show that avoiding model completeness in mathematical practice seems also motivated by the need for unification. But I argue that contemporary philosophical discussions on unification as a criterion for understanding via mathematical proof need finer grained distinctions, and in particular need to carefully distinguish between the type of unification provided by model completeness and the type of unification that motivates resistance to model completeness. I conclude that if one is committed to unification as a criterion for understanding, then only a pluralist attitude towards mathematical understanding can adequately acount for the distinction just mentioned.

Beliefs: from inconsistent to consistent

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Plausibility models, Kripke models in which the accessibility relation is interpreted as a plausibility order, were introduced in (2; 3; 1). In such models we can understand an agent's beliefs as what is true in those epistemic that are maximal under the plausibility order, that is, those epistemic possibilities that, from the agent's perspective, are the most likely to be the case. These models have been used as the basis for analysing belief revision, an action that in this context is understood as an operation that modifies the plausibility order. This plausibility order has typically assumed to be a total preorder, so the plausibility model represents only consistent beliefs. Our work starts by exploring a plausibility order that only needs to be a preorder, and thus allows us to represent inconsistent beliefs: the agent can believe both 'and :' at the same time. We compare this approach to what we get when we represent beliefs with neighbourhood models. Then we move to the study of methods to solve inconsistencies, which in this framework are the different operations on the plausibility relation that connects branches in the plausibility order and therefore make the agent's beliefs consistent.

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