

**“ANOTHER WORLD IS POSSIBLE”
CONFERENCE ON DAVID LEWIS**

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1 Overview

“Another world is possible”, the conference in memory and in honor of David Lewis (1941-2001), (<https://sites.google.com/site/conferencelewis/home>) took place at the University “Carlo Bo” of Urbino, on the 16th, 17th and 18th of June. In these three days several philosophers have presented and discussed some of the most interesting Lewisian themes, showing their current research development.

The conference has been structured into five 90 minutes plenary talks, each one followed by a session focused on a particular topic. Andrea Bottani from University of Bergamo, Sònia Roca-Royes from University of Stirling, John Collins from Columbia University, John Divers from University of Leeds and Vincenzo Fano from University of Urbino presented their papers in the first ones, while the latter ones were “Semantics and Convention”, “Mereology, Properties and Persistence”, “Counterfactuals”, “Modality and Possible Worlds” and “Causality and Time”¹. Each post-plenary session consisted in three 45 minutes talks about the selected topic. In this reportage we will keep this structure reporting all five plenary talks and the abstracts of every session.

We would congratulate for the efficient organization with the Organizing Committee, composed by Aphex’s editorial team (<http://www.aphex.it/>), thanking them warmly for their willingness, without which this reportage could not have been written.

¹The second talk scheduled in this last session, of which we report the abstract, did not take place due to the absence of the speaker.

2 Plenary talks

2.1 *What Temporary Intrinsic tell us about Persistence*

Andrea Bottani (University of Bergamo)

Abstract. The so-called argument from temporary intrinsics is among the most controversial aspects of Lewis' theory of persistence (Lewis 1988, 1988a, 2002). Indeed, the argument has very often been found inconclusive, on the ground that it does not succeed in establishing that temporary intrinsics can only be accommodated by embracing perdurantism (see, among many others, Johnston 1987, Haslanger 1989, Merricks 1994, Lowe 1987, van Inwagen 1990, Zimmermann 2005, Wasserman 2005, Odden 2010). According to Zimmermann, Merricks and other presentists, temporary intrinsics can perfectly well be accommodated in a presentist account of persistence. According to Lowe, endurantists can account for the temporary intrinsic properties of a whole by treating them as temporary extrinsic relations between its parts. According to Johnston and to others, temporary intrinsics can be accounted for by relativizing to time the relation of instantiation. And, according to Haslanger, Lewis' argument can be blocked simply by adjusting the notion of an intrinsic property. I shall argue that Lewis' argument from temporary intrinsics is inconclusive for a stronger reason, since endurantists can have a B-theory of time, abstain from indexing the copula, share the Lewisian notion of an intrinsic property and still give a convincing account of temporary intrinsics. They have only to recognize that intrinsic really monadic properties are sometimes neither determinately true nor determinately false of persistent objects. Then I shall argue that, if persistent objects determinately have at least some really intrinsic monadic properties, then neither perdurantism nor presentism can convincingly account for them.

Review. Starting from the problems of persistence and change across time, Bottani analyses Lewis' position on the theme focusing on his major arguments.

Given that change requires both persistence and discernibility, while persistence requires identity, an antinomy raises between the indiscernibility provided by identity and the discernibility needed by change. Once distinguished perdurance and endurance,

Something *perdures* iff it persists by having different parts, or stages, at different times, though no one part of it is wholly present at more than one time; whereas it *endures* iff it persists by being wholly present at more than one time. (Lewis 1986)

Lewis proposes three different solutions: there are no intrinsics properties but at least disguised relations; something has intrinsics properties only at the present moment, not in others; different intrinsics properties belong to different things, they are properties of temporal parts whose objects are made of. He concludes that only adopting endurantism the problem could be solved, while perdurantism is doomed to fail. According to him, Bottani claims that perdurantism cannot give a convincing solution to the problem of temporary intrinsics.

In this order he attacks Lewis' notion of simpliciter property, which supposes an absolutely monadic or purely timeless property, in favor of a time-relative one; meanwhile he concedes that temporary intrinsics could be treated as absolutely monadic, approaching them through a different account. Bottani focuses therefore on two perplexities about the idea that persistent entities can have timeless properties.

The first one concerns the semantical tenselessly of:

- (1) The set of dogs contains Bobby.
- (2) The set of beings barking at midnight of July 22th, 2002 contains Bobby.

in which no tense is implicitly involved in the definite descriptions “the set of dogs” and “the set of beings barking at midnight of July 22th, 2002”. In fact, if that were the set of dogs, then it would contain all things that were, are or will be dogs, while the set of not-dogs would contain all that did not be, is not or will not be more a dog and Bobby, after death, would belong to both sets. Nonetheless (1) and (2) could not be true if entities existing in time have no tenselessly property: Bobby has in fact the tenselessly property of “being a dog” that establish the two-place set-theoretical relation between it and the set of dogs.

The latter perplexity concerns the frame-relativeness of such properties. According to perdurantism, entities are four-dimensional worms provided of temporal parts, while our intuitions say that if something has a certain tenselessly property it will instantiate it through all its lifespan. Hence, this argument seems to be valid and sound:

- (4) The sheet is timelessly not-flat.
- (5) The sheet existed (will exist) at time t .
- (6) The sheet is not flat-at- t .

but in the perdurantist view does not. Indeed if (5) refers to a temporal part it is true but (6) does not follow from the premises, while if (5) refers to the four-dimensional worm the conclusion follows but (5) is false because a worm cannot exist at just one moment of its long lifespan. Therefore, for perdurantism, the timeless properties of a sheet can have no bearing on its temporally qualified properties because “ x is timelessly P and exist at t ” does not imply “ x is P-at- t ”.

Following these considerations, Bottani introduces the “temporary distributivity of predication”:

$$(DPT) \quad P(x) \text{ at } (i^1 + i^2) \text{ iff } [(P(x) \text{ at } i^1) \text{ and } (P(x) \text{ at } i^2)]$$

which claims that if an object has a property in every instant in an interval, then it has the property for the all interval. Perdurantism implies a radical negation of this principle, therefore this account brings Bottani to claim that ordinary objects do not exist, in contrast to its initial purpose, which was to explain how such objects persist. Neither a reductionist stance on persistence, as the stage view, could improve this account: it falls under the same difficulties providing only a temporal counterpart for the thing in (5) and lacking to characterize the thing itself, that is the stage that exists now. Hence it seems that the perdurantism framework differs in determining the timelessly properties of worms respect that own of ordinary objects, failing in solving this problem.

Finally, basing on Fine’s *sempiternal* and *eternal* distinction (Fine 2005), Bottani concludes his talk presenting a tripartition on having a timeless property. A thing can be essential x , not-essential x or radically indeterminate x (indeterminate whether it is x and whether it is not x). Despite just mentioned, this account appears to be interesting, showing its compatibility with all classical logic’s principles, avoiding ontological vagueness and providing a sort of “flexibility” through the same property and different objects.

2.2 Conflation, primitive modality, and the Humean intuition

Sònia Roca Royes (University of Stirling)

Abstract. The paper is mostly an exploratory exercise. It is also a comparative exercise. I explore, comparatively, some of the pros and cons of Linguistic Abstractism and Lewisian Concretism on the nature of possible worlds. I grant – for the purposes of the paper – Lewis’ two main criticisms against Linguistic Abstractism – namely, that it must resort to primitive modality and that it does not have sufficient descriptive power. It is on the basis of those criticisms that Lewis constructs his abductive argument for Concretism. By exploring how representation *de re* works in a Lewisian Concretist account, I find support for the claim that Lewis’ account suffers from some – a limited amount of – those same problems. This, if correct, weakens the abductive argument for Lewisian Concretism – although only accordingly limitedly. By continuing to exploring the commitments of the Lewisian Concretist account, I find support also for the claim that the account is committed to necessary connections among different existents of exactly the kind that Lewis says there are not. This, if correct, generates an internal tension in Lewis’ Concretism; one that would substantially weaken Lewis’ abductive argument, perhaps to the point of Abstractism coming out, even when granting the problems above, as a provisional winner. The Concretist has nonetheless room for manoeuvre, and there is a move that suggests itself. Yet, that move will cost something, and further exploratory work should be done to evaluate its exact price. I leave this further task for another occasion, but I anticipate where, I think, these further efforts should concentrate.

Review. Lewis’ Concretism uses Plenitude to guarantee enough descriptive power to Modal Realism. Lewis postulates then a possible world for every possible way a world can be. It is possible to ask: can the plurality of worlds be made in a different way? Lewis answers “No”, but Sònia Roca Royes claims that both a negative and a positive answer are available. However, different answers involve different costs.

Lewis’ negative answer prevents Modal Realism to lose descriptive power (there would be uninstantiated possibilities), he forces him to postulate necessary connections between causally and spatiotemporally isolated possible worlds. A positive answer leads to the claims that the plurality of worlds satisfies the Principle of Plenitude (PP) in a contingent way, avoiding the lack of descriptive power and the postulation of necessary connections between possible worlds. The cost of this second approach is a major difficulty in resisting to the Ersatzers’ theories.

After this introduction, Roca Royes proposes a simplified case study to go deeper into the problem of necessary connections between possible worlds: in the actual world @ subject *a* throws a glass *b* (*Tab*) and the glass breaks (*Bb*). This situation is synthetically written as *Tab* & *Bb*. Because of PP, must be there a possible world *w*₁ in which a counterpart of *a*, the subject *c*, throws a counterpart of *b*, the glass *d*, and *d* doesn’t break: *Tcd* & $\neg Bd$.

@ is connected to itself and to *w*₁ by a representation relation, and the same happens to *w*₁: *Tab* & *Bb* represents the possibility that in @ *a* could have thrown *b* and *b* could have broke (which is what actually happened in @) and the possibility that *Tcd* & *Bd*. In the same way, *Tcd* & $\neg Bb$ represents the possibilities *Tab* & $\neg Bb$ and *Tcd* & $\neg Bb$.

The following terminology will be used: @-possibility/*w*₁ (abbreviated in @/*w*₁) is the possible way @ could be, represented by the world *w*₁.

Roca Royes introduces then a distinction between “*de re* ways” a world could be (which are ways involving particular individuals and are therefore ways in which only one world could be) and “qualitative ways” many worlds could be, involving undetermined individuals. In the

example proposed, @ could be *de re* $Tab \ \& \ Bb$ or $Tab \ \& \ \neg Bb$, but not $Tcd \ \& \ Bd$ or $Tcd \ \& \ \neg Bd$. Qualitative ways in which @ and w_1 could be are $Txy \ \& \ Bx$ or $Txy \ \& \ \neg Bx$.

Recalling the quotation in (Lewis 1986) that «There is but one totality of worlds; it is not a world, it could not have been different» (NCP), and using her distinction between *de re* and qualitative ways, Roca Royes asks now: is the totality of worlds the way it is in the qualitative sense or in the *de re* sense? Her answer is that the totality of worlds is necessarily the way it is in the qualitative sense, but it is contingently the way it is in the *de re* sense.

The actual world represents the following *de re* world-possibilities: $@/@$, $w_1/@$, $w_2/@$, $w_3/@$ (meaning that worlds @, w_1 , w_2 , w_3 could as @ actually is). Could the conjunction

$$@/@ \ \& \ w_1/@ \ \& \ w_2/@ \ \& \ w_3/@ \ \dots$$

be true? Lewis, because of NCP, answers “No”. *De re*, the totality of worlds is

$$@/@ \ \& \ w_1/w_1 \ \& \ w_2/w_2 \ \& \ w_3/w_3 \ \dots$$

but it is not implied by NCP that the totality of worlds is *de re* the way it is. In fact, NCP does not rule out that the totality could be

$$w_3/@ \ \& \ w_2/w_1 \ \& \ w_1/w_2 \ \& \ @/w_3$$

or

$$w_1/@ \ \& \ @/w_1 \ \& \ w_2/w_2 \ \& \ w_3/w_3$$

and so on. Therefore, there are different *de re* ways the totality of worlds could be, as long as PP is satisfied from a qualitative point of view. Roca Royes calls “totality-possibility” the conjunctions of world-possibilities that don’t violate plenitude. For example, the conjunction

$$w_3/@ \ \& \ w_2/w_1 \ \& \ w_1/w_2 \ \& \ @/w_3$$

is a *de re* possibility for the totality of worlds.

The thesis is that the totality is contingently *de re* the way it is, and it does not conflict with NCP, if NCP is interpreted in the qualitative sense. This thesis, claims Roca Royes, is both unproblematic and desirable.

A possible objection is that this notion totality would require the plurality of the totality of worlds. This is not a real problem, because *de re* possibilities for the totality of worlds are qualitatively identical. Moreover, Lewisian Concretism can deal with Roca Royes proposal very easily. Assuming that the world which contains Humphrey inherits the possibility that Humphrey has six fingers, we can extend this intuition to the totality of worlds too. We can then render “It is possible for Humphrey to have six fingers” as “It is possible for the totality of worlds that Humphrey has six fingers”.

Back to the case of the thrown glass and limiting to a plurality of worlds with only two worlds, the *de re* possibilities are:

$$(Tab \ \& \ Bb) \ \& \ (Tcd \ \& \ \neg Bd) \quad \text{and} \quad (Tab \ \& \ \neg Bb) \ \& \ (Tcd \ \& \ Bd)$$

De re impossibilities are instead:

$$(Tab \ \& \ Bb) \ \& \ (Tcd \ \& \ Bd) \quad \text{and} \quad (Tab \ \& \ \neg Bb) \ \& \ (Tcd \ \& \ \neg Bd)$$

In this case study, $\neg Bb$ and $\neg Bd$ metaphysically exclude each other, as Bb and Bd do, while $\neg Bb$ and Bd necessitate each other, as Bb and $\neg Bd$ do. Generalizing the example, the necessary connections among worlds (or entities in worlds) would be stated with a necessity operator

governing an infinite disjunction of infinite conjunction of world-possibilities, which is the infinite disjunction of all totality-possibilities. In general, worlds must be in equilibrium.

The last question Roca Royes deals with is the following: is it against Lewis' analysis of modality to attribute modal properties to the totality of worlds? Her answer is "No", and she proposes an analysis of these modal properties:

$\diamond_t(p)$ iff (p) is the case according to some totality-possibility

$\Box_t(p)$ iff (p) is the case according to all totality-possibilities

Roca Royes' presentation would have proceeded further in this analysis, but her available time was over.

References

- Lewis, D. (1986), *On the Plurality of Worlds*, Oxford: Blackwell.

2.3 *The Parsing of the Possible* John Collins (Columbia University)

Abstract. If the verb ‘to parse’ is taken not in its narrower grammatical sense, but in the more general sense of ‘resolving a thing into its component parts’, then the problem of the ‘parsing of the possible’ is that of finding a principled way of carving logical space more finely than one can using the tool of the counterfactual conditional. This paper reviews the reasons for rejecting a conditional analysis of dispositions (finks, masks, and mimics) and argues that David Lewis’s denial of the possibility of masked dispositions robs us of an important resource: dispositional concepts that are concepts of component dispositions. A satisfactory metaphysical account of component dispositions could be used to overturn the conventional direction of analysis and provide a dispositional account of counterfactual conditionals and causation.

Review. Collins’ talk aims to argue against the supporters of simple counterfactual. He starts proposing the squashball example: the ball is elastic (it has a disposition to being elastic), but it can be broken if immersed in liquid nitrogen. This demonstrates that dispositions, like other properties, can be gain and lost. A particular kind of disposition are finkish dispositions, and here is how Lewis defines them:

Anything can cause anything; so stimulus *s* itself might chance to be the very thing that would cause the disposition to give response *r* to stimulus *s* to go away. If it went away quickly enough, it would not be manifested. In this way it could be false that if *x* were to undergo *s*, *x* would give response *r*. And yet, so long as *s* does not come along, *x* retains its disposition. Such a disposition, which would straight away vanish if put to the test, is called finkish. A finkishly fragile thing is fragile, sure enough, so long as it is not struck. But if it were struck, it would straight away cease to be fragile, and it would not break. (Lewis 1997)

Finkish dispositions are intrinsic properties and any of them is a counter-example to the simple conditional analysis, this analysis needs so to be reformed. Lewis performs this task basing his theory on cause and disposition. Collins claims that this analysis has been accepted by many, while the counterfactual analysis of causation has been widely attacked, but they are in fact parallel.

Even if it’s possible to build cases that involve both causation and disposition, Lewis gives quite different answers to the problem of causation and disposition. Collins’ suggestion is instead that parallel problems require parallel analyses.

The next step is the analysis of the so-called “masking phenomenon”, in which a disposition is retained but fails to manifest, and of the “mimicking phenomenon”, in which a disposition is lost but another cause mimics it. In the second case, we are in presence of finkish dispositions, while in the first case we are not. The situation described is represented in the following table.

off-finks	on-finks
masking	mimicking

Lewis deals with the first and the second line in two different ways, respectively by revising the counterfactual analysis of dispositions and by proposing the strategy of complicating the stimulus. In particular, the second strategy appears very complicated to Collins, and not very promising.

He proposes instead to treat these similar problem in a similar way, by saying that in both cases the disposition fails to manifest. Within this view, we can say that the vase is fragile but fragility fails to manifest because it is masked (by packing material, for example). A disposition can still fail to manifest, even if the stimuli are satisfied: it is masked. In fact, Collins prefers to reduce both cases to masking theory, analyzing counterfactuals in terms of dispositions.

He distinguishes between “total dispositions”, for which counterfactual analysis holds, and “component dispositions”, for which we don’t generally have rules of composition, as addition (we have rules of composition in cases like physical forces with precise rules for vector composition).

Therefore, we can recognize a common pattern for the dispositional analysis of causation:

- belief and desire as dispositions to action, component parts to a rational agent to act;
- intrinsic desires, dispositional components of an agent;
- Cartwright’s explanation in terms of component disposition.

Collins concludes his talk quoting the opening lines from *The Passing of the Possible* in (Goodman 1955) and asking for a new method for analytical metaphysics.

References

- Goodman, N. (1955), *Facts, fiction, and forecast*, Cambridge (MA): Harvard University Press 1983.
- Lewis, D. (1997), “Finkish Dispositions”, in *The Philosophical Quarterly*, Vol. 47, No. 187, pp. 143-158.

2.4 *Lewis – he himself! – on the analysis of modality*

John Divers (University of Leeds)

Abstract. Much of the debate about what Lewis has (not) achieved with respect to his proposed analysis of modality is vitiated by failure to take proper account of Lewis's own conception of what his project is. By identifying, and reflecting upon, Lewis's own conception of his project we will appreciate better what he did (not) achieve by his own lights. But there is more to learn. For even if we do not accept Lewis's own conception of what analysis is, or ought to be, we (at least) derive from Lewis a standard of what an appropriately detailed and careful conception of analysis should amount to – a conception of the questions that an analysis must address in order to amount to a properly evaluable proposal. In light of my conclusions, I deal critically with various treatments of the topic of Lewis on the analysis of modality.

Review. Divers' talk focuses on the proper Lewisian definition of analysis in order to review some of the criticisms to Lewis' works. In order to satisfy this aim he starts providing, according to Lewis' own, a faithful definition of analysis:

An *analysis* is an analytic theory that relates an input/data sentence to an output/theory sentence.

Analysis can be represented with a triple $\langle O, D_i, M \rangle$ in which O stands for "Opinion-sentence", D_i for "Network of Definitions and Inferences" and M for "Metaphysical-sentence". The first sentence, the input/data one, stands for a body of opinion, usually the analyst's own. Hence, it has a doxastic status, expressing all that is taken to be true and playing the role of the "analysandum". The analysis then develops dealing with a singular element of the O-sentence: its aim is metaphysical, therefore the output/theory sentence will be conceived as establishing the metaphysical base of what is to be taken as a comprehensive account of what there is.

Once defined a satisfying account, Divers proceeds describing in details analysis' features and criteria, as intended by Lewis.

First of all, an analysis has an *operational directive*: it aims to achieve systematization, constructing a Metaphysical-sentence that captures all the aspects of the O-sentence. It performs this task by means of the method of *definition*: setting up a network of analytic hypotheses and inferences (D_i), the theory links the O-sentence to the M-sentence.

Secondly, an analysis is successful if it fulfills the aim of *conservativeness* and *economy*. By conservativeness Divers means the capability to maximize the capture of opinion without corrupting it, while by economy he intends the best explanation with the lowest metaphysical costs possible.

Finally, an analysis has to follow several *rules of thumb for the application*, individually and in combination, of each criterion of success. On one hand, in order to evaluate economy, it should be considered that, *ceteris paribus*, is more advantageous favoring ontological qualitative economy than quantitative economy; concerning conservativeness, prephilosophical opinion outranks philosophical one. On the other hand, in combination, conservativeness has to be favored respect economy.

At this stage Divers recalls two long quotations from (Lewis 1973) and (Lewis 1986), which endorse his claims and remark how the American philosopher based his research to this account.

In the final part of his talk, Divers concludes highlighting some inconsistencies in the criticisms to Lewis. Referring mostly to the clearest misunderstandings of the literature, he lists five systematic misconceptions about Lewis' works:

- confusion between Lewis's project with one's own;
- failure to fully articulate an alternative conception;
- failure to distinguish the analytic theory from its subject-matter;
- failure to distinguish the components of the analytic theory;
- failure to appreciate the relevance of ontology to analysis.

This talk was very accurate, well-argued and original and it showed an aspect of Lewis' thought usually overlooked/neglected.

2.5 *Recent developments on Lewis' definition of time travel* Vincenzo Fano (University of Urbino)

Abstract. In 1976, Lewis gave a definition of time travel that was later widely used by philosophers: a time travel occurs when the separation in external time between departure and arrival does not equal the duration, in the traveler's proper time, of the journey. It has been successively argued that this definition does not capture neither a necessary condition for a time travel (a backward time travel can simply occur even if its duration equals the temporal separation between departure and arrival), nor, more significantly, a sufficient condition. Indeed, in Special Relativity, the meaning of the locution "separation in time..." is not at all clear insofar as the relativity of simultaneity in general implies different separations between events for observers in relative motion, and, in General Relativity, even if it is possible to earn an objective meaning for that "temporal separation", what results is that almost everyone who moves, in a sense, would qualify as a time traveler. It has been often adopted, therefore, another definition, simply stating that a time travel (into the past) is that journey (called Gödelian time travel) occurring in those closed timelike curves obtainable from some general relativistic solutions whose spacetimes have particularly curved topological structures. Lewis' definition, however, is not to be disregarded. Its importance resides in the fact that it does seem to capture an important intuitive sense of time travel insofar as it stresses the natural necessity to compare the traveler's time and the "time of the world". This fact is particularly clear in Wellsian time travel, in which time traveler may roughly be imagined suddenly disappear at a certain instant and then somehow reappear at another instant. Such a travel, usually considered to take place in Newtonian or Minkowskian spacetimes, occurs in a global ordered temporal background, so that it is formally possible that temporal comparison. On the contrary, a Gödelian time travel, for instance happening in a Gödel universe, has no external temporal frame of reference valid for the whole spacetime: there is only a proper time always directed towards the traveler local future. From this viewpoint, only a Wellsian travel can be seen as an effective travel through time, as a "movement" over time, whereas a Gödelian one is only – as it were – a travel "of" spacetime: its closed curve merely represents the spatiotemporal constraint for the traveler. Unfortunately, Wellsian travel is not considered deserving serious scientific attention both because the traveler's worldline has an anomalous structure not easily explainable from a physical viewpoint and because it leads to indigestible causal relations in which effects precede causes. In this talk I will argue that that "Lewisian intuitive sense" can be recovered also for some particular Gödelian time travels which, theoretically, happen in bounded regions of universes, like ours, in which Weyl's Principle holds. Such a principle, stating the regularity (non-vorticity) of the divergent worldlines of galaxies, allows to foliate spacetime in a sequence of time slices. Thus it makes sense a temporal evolution of the universe as a whole because a global temporal order with respect to the comparisons "later than" or "earlier than" exists. Consequently, it becomes possible, in principle, to compare local time orders of closed curves with objective temporal orderings of "the rest of the world". In this sense, this kind of local Gödelian time travel recovers, at least partially, that more proper status of travel through time initially available only for the unphysical Wellsian travel.

Review. Vincenzo Fano's talk focuses on the notion of time travel (TT), starting from the definition given by Lewis:

If [someone] is a time traveler, the separation in time between departure and arrival does not equal the duration of his journey. (Lewis 1976)

Fano presents then some aspects of time traveling. Lewis' definition isn't scientifically accurate, because it does not consider special relativity and the problems arising when trying to define what simultaneity is. However, in Lewis' definition we find a distinction between personal time and external time. Therefore, we can state the following: if these two kinds of time do not coincide, then we have a TT.

It is now possible to identify two kinds of TT:

- Wellsian TT, derived from the novella "The Time Machine" by H.G. Wells, which is physically impossible, as it is set in the context of the Newtonian universe;
- Gödelian TT, which is physically possible (even if it is more a "travel of time" rather than a TT).

Gödelian TT is a consequence of Gödel's solution to some of Einstein's field equations² and is theoretically possible, but only backwards and in a general relativity frame. Gödel's solution in fact implies CTCs (Closed Time Courses or Closed Timelike Curves), worldlines in closed spacetime which curve so severely that they curve back to themselves, resulting in an older version of a certain object appearing at one of its own earlier spacetime points.

Due to relativistic theories, we can no longer maintain a unique notion of "time": time is rather an emergent property of what happens, depending on the adopted theory. We can identify four "kinds" of time, depending on the objects considered and the theory which considers them: Minkowskian time (as in a particle accelerator), Newtonian time (as in "normal" contexts, for middle-sized bodies), semi-Reinmannian time (as in the time of a star) and semi-Newtonian time (as in the time of the cosmos).

With this differentiation, we can distinguish the two times required by Lewis' definition in a naturalistic way: external time is the semi-Newtonian (cosmic) time, while personal time is the time of a certain part of the cosmos (particles, middle-sized bodies or stars). Still, Minkowskian time and Newtonian time do not make use of general relativity and, as said, TT is possible only in a general relativity frame: therefore, the personal time could be only semi-Reinmannian time.

Fano proposes at this point a new definition of TT in the past:

A TT in the past occurs when a body moves in its time from a successive instant to a preceding one in cosmic time.

The question is then: how to embed a CTC in a semi-Newtonian space-time? The answer is that if the CTC concerns more than one point in cosmic time, then an actual TT is possible. An actual TT is therefore a CTC (in which, from the point of view of the object, holds a semi-Reinmannian metric) in a globally (from the point of view of the cosmos) semi-Newtonian space-time. After these considerations, Fano proposes a definition of a Consistent TT:

A Consistent TT is a TT in which what happens in the cosmic time t_1 (the event E_1) is caused by what happens at cosmic time t_2 (the event E_2) on a local CTC, but E_1 does not make E_2 impossible.

A further question arises: is it possible for the to future actually change the past? Lewis in his 1976 paper, notes that the past can be changed if we assume more than a universe (if we

²The equations in which the stress-energy tensor contains two terms, the first representing the matter density of a homogeneous distribution of swirling dust particles, and the second associated with a nonzero cosmological constant.

assume a multiverse). Changing the past is then a metaphysical possibility, but a nomological impossibility. This conclusion conflicts with the grandfather paradox³, which seems to make changing the past impossible. Lewis is said to be unable to give a satisfying solution to this paradox, so Fano leans on the rather disappointing proposal by J. Earman: natural laws must explain the possibility of TT, but also the impossibility of changing the past, but such a physics is not currently available, so the problem remains unsolved.

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³The grandfather paradox can be roughly summarized as the situation in which an individual, entering in a CTC and making a TT, kills his grandfather or prevents him from procreation, making his TT possible (nomologically) and impossible (she should never have been born).

3 Abstracts from “Semantics and Convention”

3.1 *Linguistic Conventions*

Mark Cain (Oxford Brookes University)

David Lewis (1969), (1975) argued that conventions lie at the heart of language and developed a highly influential account of the nature of linguistic conventions. Such a view of language clashes with the Chomskyan position that portrays language as an internal psychological state of a speaker. In this paper my aim is to investigate this conflict. Following some Chomskyan critics of Lewis (particularly Stephen Laurence (1996), (1998)) I will argue that if we understand conventions along the lines recommended by Lewis then it is implausible on empirical grounds that conventions lie at the heart of language. This is because following a Lewisian convention involves having theory of mind skills that young children and sufferers of cognitive deficits such as autism do not have. For, the difficulty that such subjects have in passing the false-belief test suggests that they are unable to form the kind of higher-order propositional attitudes that are central to following a convention on Lewis’s account.

However, this result does not in itself undermine a conventionalist view of language for one might argue that the problem lies with Lewis’s account of convention. In particular, that Lewis’s account is far too over-intellectualized. Such a charge has been made by Ruth Garrett Millikan (1998) and Michael Devitt (2006) both of whom develop related accounts of convention in the context of attacking the Chomskyan view that conventions have little role to play in language. I will argue against Millikan and Devitt’s view of the nature of convention by producing a number of counterexamples relating to food preferences and senses of humour. This suggests that it would be unwise to retreat very far from Lewis’s account of convention.

My overall conclusion therefore has two elements. First, Lewis has provided an account of convention of lasting interest and significance that is to be preferred to more recent alternatives. Second, there are good reasons for doubting that conventions are as central to language as Lewis thought. This conclusion has greatest plausibility when applied to syntax. However, I will argue, there are reasons to think that it also applies in the semantic domain: that is, the pairing of sounds and meanings in a language are not a matter of convention.

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3.2 *Lewis' Convention Revisited: The Epistemic Root of Conventions* **Luca Tummolini (Istituto di Scienze e Tecnologie della Cognizione, CNR)**

According to many, there is a distinction between two conceptions of rules (Rawls 1955; Searle 1969): a rule is 'regulative' when it aims to regulate actions that exist independently of the rule itself, and a rule is 'constitutive' when it aims to regulate actions that depend on the rule itself for their existence (Searle 1995). While the most often cited example of the former kind is "driving on the right" (an action that can be executed whether or not there is in fact a rule that prescribes to drive on the right), the latter kind of rule enables action such as "promising" and the like.

Recently, it has been proposed that it is useful to introduce a parallel distinction between two kinds of conventions (Marmor 2009: 31-57). The first kind of convention is aimed to coordinate the behaviour of a population of agents and "driving on the right" is the prototypical example. The second kind is aimed to constitute social practices like chess whose actions (e.g. "checkmate") would not exist independently from the social practice.

Though the rationale behind the distinction is different, Lewis himself has amended his original definition (1969) and offered an analysis of convention that identifies two kinds of regularities: conventional regularities in action and conventional regularities in action and belief (Lewis 1975). Following the same reasoning, one can even suggest the existence of conventional regularities in beliefs alone.

Hence, how many kinds of convention are there? How do these different kinds map on the two conceptions of rule? And, more importantly, is there any useful distinction between a social convention and a social institution?

The aim of this paper is to argue for the existence of epistemic conventions (i.e. conventional regularities in beliefs alone) and to suggest that we only need one coherent notion of convention that is specific to belief-based and goal-driven (cognitive) agents like us. In particular, I aim to show that a convention in the epistemic sense is always presupposed even by the simplest behavioural regularities that we consider conventions.

In order to support this claim, I will argue that Lewis' classical analysis rests on the agents having a "shared acquaintance with a precedence" (Lewis 1969: 40), and that he has offered a reconstruction of the possible explicit reasoning that the agents might endorse in order to predict each other's actions (Cubitt & Sugden 2003).

However, I will argue that such explicit deliberation is not actually required for a convention to perpetuate itself, because it suffices that the agents are able to believe in a coordinated way that something is a precedent. I will then introduce the notion of conventional regularities in beliefs (epistemic conventions). Conventional regularities in beliefs rest, ultimately, on the fact that those that interact together have been nurtured within a population that have evolved the appropriate concepts of what counts as precedent. In this view, salience, i.e. the property of some entity of standing out "from the rest by its uniqueness in some conspicuous respect" (Lewis 1969: 35), is the same property that it is commonly named affordance within the cognitive science community: the property of some entities to indicate to the agents the relevant interactive possibilities in a specific context (Gibson 1979). Moreover, though it is correct that precedent is the source of a form of salience, this salience or affordance is the product of a cultural evolutionary process and cannot be justified at the individual level as Lewis has attempted to do.

Having accomplished this, I will argue that there is in fact no meaningful way to separate social conventions from social institutions, or, which is the same, conventions aimed at coor-

minating already existing behaviours from conventions aimed at constituting new kinds of behaviours. Though I will argue that the distinction between two kinds of conventions or two conceptions of rules should be dropped, I will contend that it is useful to retain, within the same coherent notion of convention (the regularity conception proposed by Lewis), a distinction in relation to the different possible targets of such regularities: from purely epistemic convention (regularity in beliefs), to the cognitively hybrid (regularity in action and belief), and the purely behavioural ones (regularity in action).

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3.3 Metaphysics of Pain; Semantics of “Pain” **Alik Pelman (Hebrew University of Jerusalem)**

I propose a methodology for analysis that I find rather powerful in general. It is based on the separation of the metaphysical and the semantic assumptions that lie behind positions and arguments, by means of possible-worlds analysis. The efficacy of such methodology is demonstrated by applying it to the Kripke-Lewis debate over the identity theory of mind. Such application yields a clear exposition of the competing positions and of their mutual objections, as well as a convenient way of reassessing their merit. The overall picture that emerges reveals some surprising results. To the extent that the proposed methodology is helpful, it could lead to further similar applications.

Kripke and Lewis famously debated the identification of the mental with the physical, specifically in the form of the functionalist identity theory of mind. In line with their shared fondness of possible-worlds analysis, each of the arguments accuses its opponent’s position of having some unacceptable modal consequence. Specifically, Kripke accuses functionalism of allowing pain not to be painful in some possible worlds, whereas Lewis accuses Kripke’s position of allowing that a painful state is not pain in some possible worlds.

We analyze and reassess the debate by separating the metaphysical and semantic assumptions – first, of the positions themselves, and then of their mutual objections. The first stage makes apparent the differences between the two positions, by contrasting their underlying assumptions:

	Semantics	Metaphysics
Lewis’ Position	“pain” is descriptive. “Pain” designates, with respect to every possible world, that which is painful in that world.	Being painful is neither necessary nor sufficient. There are possible worlds where the actual painful state is not painful, and there are possible worlds where being painful is instantiated by a state other than the one that actually instantiates it.
Kripke’s Position	“pain” is <i>de jure</i> rigid. “Pain” is stipulated to designate, with respect to every possible world, that which it designates in the actual world.	Being painful is necessary and sufficient. There is no possible world where the actual painful state is not painful, and there are no possible world where being painful is instantiated by a state other than the one that actually instantiates it.

This stage also clearly reveals that despite differences, both positions equally entail the desired consequence, that “pain” designates all and only painful states.

The second stage – namely, separating the assumptions that lie behind the mutual objections – reveals that both parties successfully refute the same position (albeit on different grounds):

Attacked Position	“pain” is <i>de jure</i> rigid. “Pain” is stipulated to designate, with respect to every possible world, that which it designates in the actual world.	Being painful is neither necessary nor sufficient. There are possible worlds where the actual painful state is not painful, and there are possible worlds where being painful is instantiated by a state other than the one that actually instantiates it.
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However, this position is different from both Lewis’s and Kripke’s. In other words, we have three positions here, each of which comprises a different combination of metaphysical and semantic assumptions.

Ultimately then, both arguments misfire: while each position accuses the other of having some unacceptable modal consequences, neither position in fact has the unacceptable consequences ascribed to it.

4 Abstracts from “Mereology, Properties and Persistence”

4.1 *Why Immanent Causation is Bad Mereological Glue*

Stephan Torre (University of Barcelona)

David Lewis famously endorses the doctrine of unrestricted composition according to which for any objects, the *x*s, there exists an object that contains all and only the *x*s as parts. Two main difficulties that may be raised with Lewis’s doctrine of unrestricted composition are (a) that it runs contrary to common sense and (b) that it leads to scientifically revisionary conclusions. According to common sense, there is no object composed of all current Romanian kindergarteners, Stalin’s mustache, and the southernmost Starbucks. But Lewis’s doctrine of unrestricted composition entails that there is such an object. Furthermore, according to physics, there are no objects that travel faster than the speed of light. However, Hud Hudson (2001) has shown that assuming Lewis’s doctrine of unrestricted composition, along with the doctrine of temporal parts (also endorsed by Lewis), and the standard theory of motion, there are many objects traveling many times faster than the speed of light. So it seems that unrestricted composition (plus the doctrine of temporal parts) commits us to a scientifically revisionary conclusion.

In my paper, I evaluate an attempt to avoid these negative consequences by appealing to immanent causation as a restriction on composition. What makes the table that my laptop is resting on the same object that was here yesterday? Presumably it is because today’s table stages are causally related in the right kind of way to the table stages that were in this location yesterday. If Zeus annihilated the table at a time arbitrarily close to midnight and Hera coincidentally created an exactly similar one in the same location at midnight, then today’s table stages would not stand in the requisite causal relation. The type of causation that relates the various stages of one and the same object is immanent causation.

In (2010) and (2003), Yuri Balashov argues for immanent causation as a necessary condition for diachronic composition. His thesis can be stated roughly as follows:

(IC) For any material objects, the *x*s, there exists a *y* such that the *x*s diachronically compose *y* only if the *x*s exist at different moments and they are immanently causally related.

At first glance, such a restriction on composition seems capable of avoiding the main difficulties cited above for Lewis’s theory of unrestricted composition. First, it entails that there is no object composed of all current Romanian kindergarteners, Stalin’s mustache and the southern-most Starbucks since the relevant object stages fail to stand in the right kind of causal relation. Secondly, such a restriction rules out objects that travel faster than the speed of light: since the causal signal cannot exceed the speed of light, Hudson’s fast moving objects are excluded from the resultant ontology.

I argue that the appeal to immanent causation as a necessary condition on composition fails to achieve the desired results. In section one, I provide an argument for the conclusion that restricting composition by appeal to immanent causation excludes ordinary objects from one’s ontology. In the second section, I provide an objection to Dean Zimmerman’s (1997) account of immanent causation which is intended to apply to mereologically constant masses. In the final section I argue that special relativity is incompatible with using immanent causation as a means of restricting diachronic composition. In the last section, I conclude that we should endorse unrestricted diachronic composition and I suggest ways of dispelling the

two main worries cited above.

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4.2 *Natural Properties, Supervenience, and Composition* **Andrea Borghini (College of the Holy Cross), Giorgio Lando (Scuola Normale Superiore, Pisa)**

David Lewis’s metaphysics is committed to the claim that some properties are natural. The claim serves three chief purposes: (i) it provides a grounding for the definition of intrinsic properties, thereby securing (ii) Lewis’s version of the Principle of Recombination (roughly: “Anything can coexist with anything”) and (iii) the identification of the basis for so-called Humean Supervenience. The claim that some properties are natural is in itself neutral about the identification of their bearers. However, according to Lewis’ characterization of Humean Supervenience as a pivotal thesis of his entire philosophical work (Introduction to Lewis, 1986, p.ix-x), natural properties are “local”, that is they are instantiated by points or point-sized entities. We question the tenability of the latter thesis, in two steps.

First step. Motivations for the commitment to natural properties do not entail the minimality of their bearers. (i) It is not required that only minimal entities should instantiate intrinsic properties. (ii) Recent works about the most proper formulation of the Principle of Recombination in modal realism show that it involves (in a non-redundant way) also complex entities (e.g. Efrid & Stoneham 2008). (iii) In Lewis, Humean Supervenience is committed to the “locality” of natural properties only in its strongest form, which is a contingent hypothesis concerning only worlds sufficiently similar to ours; its weak core («‘How things are’ is fully given by the fundamental, perfectly natural, properties and relations that those things instantiate» (Lewis 1994: 474)), which Lewis deems to be a priori and to concern any world, is compatible with the distribution of natural properties among different levels of constitutional complexity.

The second step is to confront the hypothesis that the bearers of natural properties are minimal entities with two of Lewis’ tenets about mereology and composition.

(a) The admission of unlimited mereological complexity (the so-called gunk) excludes trivially that, in gunkish worlds or parts of worlds, there are natural properties instantiated by mereological atoms. However, if natural properties were not instantiated by anything, these worlds or parts of worlds would be excluded from the domain of intrinsic properties and of the principle of recombination. Two alternatives come to mind: an infinite descent of bearers of natural properties; a privileged level under which there are no natural properties (where this level should be determined by a non-mereological criterion).

(b) According to the weak version of Composition as Identity, the relation between a whole and its parts is analogous to identity under several respects, among which the so-called “ease

of description” (Lewis 1991: 85). This could suggest that the properties of a compound supervene on the properties of the atoms and the relations between them as much as the properties of the atoms and the relations between them supervene on the properties of the compound (composition would be boring, as in (Schaffer 2003: 205)); if so, then it is not clear why the properties of the compound should be less natural than the properties of the components.

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4.3 Natural properties in counterpart theory **Ghislain Guigon (University of Geneva)**

While David Lewis warned Aristotelian essentialists to judge his counterpart theory “a false friend, a Quinean scepticism in essentialist’s clothings”, Todd Buras, in his *Counterpart Theory, Natural Properties, and Essentialism*, recently argued that adding natural properties to Lewis’s counterpart theory yields a full blooded Aristotelian essentialism. Roughly, Buras’s argument runs as follows. He interprets Lewis’s hierarchy of degrees of naturalness as entailing that perfectly natural properties are the privileged players of the similarity role. From the latter he concludes that if one adds natural properties to counterpart theory, the ontology privileges one determinate counterpart relation to determine the truth value of *de re* modal propositions: a determinate counterpart relation that is wholly determined by the number of shared perfectly natural properties.

One of my aims is to show that if the latter reasoning is sound, commitment to a full blooded essentialism is the least of the troubles for counterpart theorists who uphold Lewis’s doctrine of natural properties. Lewis advised us that his counterpart theory has the following virtues: counterpart theory can adequately explain the variability of our *de re* modal intuitions; counterpart theory allows us to solve problems of material constitution without being committed either to the existence of distinct coincident objects or to the view that identity may hold only contingently between an object and itself. Yet I shall argue that, if Buras’s argument is sound, Lewis’s counterpart theory loses these virtues if combined to his doctrine of natural properties.

However, I shall undermine Buras’s reasoning. I shall argue that the doctrine of natural properties displayed in Buras’s argument is not the doctrine Lewis has defended. In particular, and in common with many commentators, Buras misrepresents the ordering of natural properties. Most commentators interpret the naturalness ordering as a function of the complexity of the definition of a property in terms of perfectly natural properties. We might call this function the vertical axis of the naturalness ordering. However, as the theory is introduced in Lewis’s *New Work for a Theory of Universals*, properties whose definitions in terms of perfectly natural properties are equally complex can differ in naturalness depending on objective differences in resemblance of the perfectly natural properties in terms of which they

are defined. We might call this function of objective differences in resemblance of natural properties the horizontal axis of the naturalness ordering. Now in Lewis's genuine modal theorist framework, predications of resemblance to properties are not to be taken as primitive but are to be analysed in as quantified statements of comparative resemblance involving particulars that may be parts of different worlds. Taking into account these aspects of Lewis's metaphysics of properties and of his genuine modal realism, I shall argue that perfectly natural properties are not privileged to play the similarity role in a way that suits Buras's reasoning. If I am right, then adding natural properties to Lewis's counterpart theory still yields a counterpart relation that is, in accordance with Lewis's word, not very settled at all.

5 Abstracts from “Counterfactuals”

5.1 *Lewisian Themes in Molecular Biology*

Marco Nathan (Columbia University)

The philosophy of David Lewis has been (and still is) extremely influential in metaphysics. Nonetheless Lewis’ work is surprisingly neglected in the philosophy of science. My goal in this essay is to show how Lewis’ work on redundant causation and his conditional analysis of dispositions – two landmarks in the topical literature – find important applications in scientific processes. I do so by discussing two examples from molecular biology, and showing that central concepts of Lewisian metaphysics are instantiated.

The first example involves the notion of preemption. Following Lewis (1986, 2000), in asymmetric cases of redundant causation where there is a cause that brings about an effect and another cause that would have brought about the effect had the other cause been absent, let us call the former the preempting cause, and the other the pre-empted alternative. Consider the following – familiar – example. An assassin is hired to shoot a victim and, unbeknown to the killer, a deadly poison is also administered, in the eventuality that the killer fails. The assassin, who successfully performs her job, is the preempting cause of the murder; the redundant poison is the preempted alternative. The notion of preemption has taken the center of the stage in metaphysical discussions of redundant causation; however it hardly had any impact on philosophical analyses of science. By discussing a case study from molecular biology – the operon model of gene Regulation – I argue that the concept of preemption is necessary to analyze the irreducible and omnipresent role of concentration of molecules in scientific explanations.

My second example focuses on dispositions. Dispositions figure prominently in both metaphysics and the philosophy of science, albeit in different ways. Metaphysicians attempt to provide an analysis of dispositions: a set of necessary and sufficient conditions that are required for an object to have a disposition. In contrast, philosophers of science are interested in explaining why an object displays a disposition. However, while such explanations focus on dispositions that are actually manifested by objects, metaphysicians have discussed at length cases such as finking and masking, where dispositions are prevented from being expressed (Lewis 1997). I argue that examples of finking and masking are not just the product of philosophical thought experiments, but are actually exhibited in actual biological processes. As a result, they should be accommodated by causal-mechanical explanations of dispositions. Moreover, examining how finkish dispositions are explained in science sheds light on metaphysical analyses of dispositions.

This essay points out two concrete applications of Lewisian concepts in biology; however, there is also a general moral to be drawn. Mainstream philosophy of science and traditional metaphysics are currently disconnected. The fact that notions such as preemptive causation, finkish dispositions, and masking are actually instantiated in science goes to show that the two disciplines are more closely connected than is often assumed. A chief aim of this essay is to show some of the benefits of putting them back together.

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5.2 Counterfactuals, Overdetermination and Mental Causation

Simona Aimar (Oxford University)

The Exclusion Problem (EP) is well known. Consider the following claims:

- (1) Mental events sometimes cause physical events.
(Mental Causation)
- (2) Every physical event is caused by a physical event.
(Closure)
- (3) Mental events are distinct from physical events.
(Distinction)
- (4) The effects of mental events are not systematically overdetermined.
(Non-overdetermination)
- (5) If an event has more than one sufficient cause, then it is overdetermined.
(Exclusion)

As Kim (cf. Kim 1998) has elegantly shown, all of (1)-(5) are plausible enough. Taken together, however, they appear to be in tension. Suppose my decision to drink causes my opening the fridge – (1). My opening the fridge is also due to the occurrence of a neural process in my head – (2). But this neural process is distinct from my wishing for a drink – (3). Now, if this one action of fridge opening is a standard action, it is not overdetermined – (4). But then, we have to choose what causes it: is it my decision to drink, or the corresponding neural process? 'Choose whichever, but just one!' – (5) says. Thus the fact that the mental and the physical are both sufficient causes of the same effect seems at odds with the idea that this effect is not overdetermined.

Kim's response to the EP is to drop (1), mental causation (cf. (Kim 1998), esp. ch.6). For him, the EP suggests that the physical trumps the mental: its bringing about the relevant effect leaves the mental with nothing to do. Karen Bennett rejects this response (Bennett: 2003). She contends that in order to solve the EP we must reject (5), Exclusion: it is not always the case that if an event has more than one sufficient cause, then it is overdetermined.

Bennett's argument against (5) relies on the following counterfactual test for overdetermination:

e is overdetermined by *c1* and *c2* only if:

(O1) $(c1 \ \& \ \neg \ c2) > e$

(O2) $(c2 \ \& \ \neg \ c1) > e$

are both (non-vacuously) true.

Two gunwomen shoot at the same victim. If the victim dies of two bullets, and her death is overdetermined, both (O1) and (O2) come out (non-vacuously) true: if either gunwoman had not been shooting, but the other had, the victim would still have died. So it seems that the non-vacuous truth of (O1) and (O2) is a necessary condition for overdetermination (476).

Given this test, Bennett argues that mental causation is a counterexample to (5). At its bare-bones, her argument is this:

- (6) The effect *e* of mental causation has two sufficient causes – a physical cause *c1*, and a mental cause *c2* (473).
- (7) The truth of (O1) and (O2) is a necessary condition for overdetermination.
- (8) In the mental causation case, at least one of (O1) and (O2) comes out false.

So,

- (9) Mental causation is a counterexample to (5).

If sound, this argument does two things. First, it shows that there is an alternative to Kim's solution to the EP. If one accepts mental causation, one can resolve the EP by other means. Second, the argument puts counterfactuals at use in establishing whether there is overdetermination. This is an important achievement. Bennett seems to have found a way to make the notion of overdetermination neater, and to show how this notion is closely connected with counterfactuals. However, Bennett's argument fails. This paper contests its two crucial premises, (7) and (8).

5.3 *Lewis' "causation as influence" and contemporary accounts of genetic causality: how counterfactual theories of causality account for some (but not all) notions of biological information*

Barbara Osimani (Catholic University of Milan, University of Macerata)

Lewis' notion of "causation as influence" (Lewis 2000), which has been developed in order to solve tricky problems of preemption – i.e. of causal redundancy – affecting the counterfactual analysis of causation, has been recently adopted by Kenneth Waters (2007) and by James Woodward (2010) in order to account for the notion of specificity and genetic causality in biology. The debate around these two notions has different roots and touches different philosophical questions at different levels.

After presenting Lewis' notion of influence and Woodward's and Water's adaptation of this concept to their analysis of genetic causality, the paper examines the different foci of these authors: whereas Lewis' notion of influence aims to present a sophisticated account of our intuitions underlying the notion of cause tout court, Woodward's intention is to use different categories, included influence, in order to provide the cues for a typology of causes; finally Waters' question regards instead whether the selection of a cause among several candidates as "the" cause can be reduced to a pragmatic issue, or whether it can be given an ontological basis.

As it is often the case, the analysis of causation turns out to be an extremely important laboratory, for the investigation of the epistemological stances assumed by philosophers, with the related implications, and the theoretical commitments they are more or less implicitly assuming. Indeed causality theories range from semantic questions concerning the *ti estì* of

causality (“what is a cause” or “what do we mean when we use the term ‘cause?’”), to the metaphysical status of causal relationships (objective reality vs. cognitive tools for grasping it), to epistemic questions concerning the validity of inductive leaps – the inference from correlation to causation – and the methodological efforts devoted to the distinction of causal from non-causal correlations. Three main streams of philosophical work have been identified in the literature devoted to causality: probabilistic theories, counterfactual theories and mechanistic theories. Each of them strives to solve specific dilemmas arising in the analysis of causality (non-deterministic causality, causal asymmetry, preemption, etc.).

Counterfactual notions of causality (such as Lewis’s which draws on the notion of possible worlds, or Woodward’s which draws on the notion of invariance under intervention) focus on counterfactual dependence of an event upon another, or, in manipulation accounts, in a correlation between a change of values in one variable with a change of value in the other (these can be binary or multivalued, discrete or continuous). The paper illustrates how this formalization of the notion of cause allows to clarify much “informational talk” around the concept of causality, without nevertheless reducing all notions of information to causality.

6 Abstracts from “Modality and Possible Worlds”

6.1 *A Lewisian Approach to the Verification of Adaptive Systems* Fabio Gadducci (University of Pisa), Alberto Lluch Lafuente (IMT Institute for Advanced Studies, Lucca), Andrea Vandin (IMT Institute for Advanced Studies, Lucca)

Many software artifacts like software architectures or distributed programs are characterized by a high level of dynamism involving changes in their structure or behavior as a response to external stimuli or as the result of programmed reconfigurations. When reasoning on such adaptive systems one is not only interested in proving properties on their global behavior like system correctness, but also on the evolution of the single components. For instance, when analyzing the well-known stable marriage problem one would like to know whether a solution ensures that “two females never claim to be married with the same male”.

To enable automatic reasoning, two main things are needed: models for the software artifacts and logic-based languages for describing their properties. One of the most successful and versatile model for such artifacts are graphs. Regarding the property specification languages, variants of quantified temporal logics have been proposed, which combine the modal operators of temporal logics with monadic second-order logic for graphs. Unfortunately, the semantical models for such logics are not clearly cut, due to the possibility to interleave modal operators and quantifiers in formulae like $\exists x. \diamond \psi$ where x is quantified in a world but ψ states properties about x in a reachable world or state where it does not necessarily exist or even have the same identity. The issue is denoted in the quantified temporal logic literature as trans-world identity [1, 3]. A typical solution follows the so-called “Kripke semantics” approach: roughly, a set of universal items is chosen, and its elements are used to form each state. This solution is the most widely adopted, and it underlines all the proposals we are aware of.

Kripke-like solutions do not fit well with the merging, deletion and creation of components, neither allows for an easy inclusion of evolution relations possibly forming cycles: if the value of an open formula is a set of states, how to account e.g. for an element that is first deleted and then added again? This problem is often solved by restricting the class of admissible evolution relations: this forces to reformulate the state transition relation modeling the system evolution, hampering the intuitive meaning of the logic.

In [2, 5] we presented an alternative approach, inspired to counterpart theory [4]. The key point of Lewis’s proposal is the notion of counterpart, which is a consequence of his refusal to interpret the relation of trans-world sameness as strict identity. In our approach we exploit counterpart relations, i.e. (partial) functions among states, explicitly relating elements of different states. Our solution avoids some limitations of the existing approaches, in particular in what regards the treatment of the possible merging and reuse of components. Moreover, the resulting semantics is a streamlined and intuitively appealing one, yet it is general enough to cover most of the alternatives we are aware of.

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6.2 Actualizing possible worlds and mental content “de se”

Maja Kittel (Jagiellonian University)

My aim is to use David Lewis’s notion of actualizing possible worlds in order to solve one of the problems with the concept of mental content. Firstly, I will have to throw more light on the very process of “actualizing” a possible world. In my view, it is closely connected with another of Lewis’s notions: knowledge “de se”. I will argue that knowledge “de se”, as characterized in Lewis’s “Attitudes de dicto and de se” is exactly the notion we need in order to explain the process of actualizing worlds, although it still requires some clarifying. Therefore, secondly, I will shortly describe how according to various empirical data (for example studies of neonate behaviour as well as analyses of the “self” in schizophrenia), Lewis’s knowledge “de se” can be divided into at least two and at most six levels.

I will then explain how to use this enriched understanding of actualizing possible worlds in the analysis of mental content. In the many discussions about mental content, there is at least one issue that is easily lost among the sophisticated arguments: the tension between the “subjective” and processual dimension of content, the fact that it is somehow produced by a certain individual (a thinking agent) and the more objective (or intersubjective) dimension of content, often called representational or semantic, namely: the information conveyed by the content. (I am not referring here to the debate between externalism and internalism as regards the sources of content – to which one of the proposed solutions is, incidentally, the use of “centered” possible worlds in two-dimensional semantics).

If we think of content mainly in an objective fashion (for example, as of something analogous to the “that” clauses in sentences like “S believes that P is Q”), it becomes easily translatable into propositions, which usually leads us to identify mental content with meanings of linguistic sentences. There remain, however, phenomena that we find hard to ignore: the seemingly nonconceptual, processual and perhaps not even fully communicable dimensions of mental content that still has not been convincingly explained away. Philosophers typically concentrate upon the static, propositional elements of mental content or mental states and tend to overlook all the dynamic relations between the content and its bearer, the individual. This is why we have been getting closer to the roots of mental content in the external world but farther from its roots in our self-consciousness. In Lewis’s terms, we concentrate upon propositions (sets of possible worlds) we intend to make accessible to us but disregard the relation between us, concrete thinking individuals and the possible world we belong to – although without this relation, we could not make any other possible world accessible to us.

To sum up, I will show that the dynamic notion of actualizing possible worlds – the notion that brings together knowledge “de se”, self-consciousness and at least subsets of propositions – is exactly the concept we need in order to explain what mental content is.

6.3 *Between Modal Semantics and Decision Theory* Fabrizio Cariani (Northwestern University)

What is the relation between a semantics for deontic modalities and substantive theories of what one ought to do? One would expect something like this: the semantics should not imply verdicts that are incompatible with the non- controversial core of the substantive theories.

Now let's imagine two theorists, we'll call them Qualy and Quanty.

Qualy is a possible-world semanticist in the style of Lewis (1981a); Kratzer (1981). For Qualy it's true that you ought to run iff at the highest ranked possible worlds you run. Qualy throws in some context dependence here and there to make this more plausible (and perhaps adopts a dyadic analysis as in Lewis 1974).

Quanty is a decision theorist. She doesn't need to work with an orthodox version of Bayesian Decision theory, but the story will be simpler if she does. When Quanty thinks about whether you ought to run, she sets up a quantitative model-distributes values over possible worlds (or a partition of states), figures out the relevant probabilities and calculates expectations. You should run, she thinks, iff running has the highest expected value among the options available to you.

Will Qualy and Quanty agree about what you ought to do? Here is a quick argument that they won't (mind you: I do not endorse the quick argument – it's just an instructive tool). Qualy thinks that what you ought to do depends only on what happens at the best possible worlds. Quanty, instead, thinks that what you ought to do can depend on what happens at any world whose probability is non-zero. Conclusion: there are bound to be cases in which formal semantics and decision theory conflict.

Response 1. There is an equivocation in the argument. When Qualy ranks possible worlds and when Quanty does the same (with more precision), they are not using the same ranking. Lewis (1978, 1981a) embraced this response and defended it from the charge of presupposing consequentialism.

However, the response stumbles on a follow-up metasemantic question: How exactly does Qualy rank worlds? I argue that there is no non-question begging way of ranking worlds that does the job that Qualy wants done.

Response 2. Things get better if Qualy stops ranking worlds and starts ranking alternative courses of action instead. Qualy can do this without too much violence to possible-world semantics, by modelling actions as sets of possible worlds.

If Qualy does this, he can just ask his friends who do substantive theorizing to supply him with a ranking of actions: he does not need to come up with a ranking of his own. If Qualy does this, we can make better sense of recent ideas about the 'information dependence' of deontic modalities (Kolodny and MacFarlane, 2010) and produce some new arguments for favoring 'premise' semantics over 'ordering semantics'.

In this talk, I give a comprehensive account of the benefits of *Response 2*.

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7 Abstracts from “Causality and Time”

7.1 *Time Travel, Foreknowledge and the Phenomenology of Freedom* Andrea Guardo (University of Milan)

I discuss a paradox about foreknowledge. I start with a brief outline of the puzzle. Afterwards, I sketch a solution. Finally, I argue that even if the solution I sketched works, the puzzle shows that foreknowledge is inconsistent with the “phenomenology of freedom”.

Let us suppose that, at t_1 , Gawd foreknows that, at t_2 , she will start whistling *All along the Watchtower*. Can she avoid it? It seems that she cannot. Foreknowledge is a kind of knowledge, and knowledge is factive; hence, that, at t_1 , Gawd foreknows that, at t_2 , she will start whistling *All along the Watchtower* implies that, at t_2 , she will start whistling that song. However, it also seems that nothing prevents Gawd from not whistling at t_2 : she has got both the ability and the opportunity. Therefore, it seems both that she can and that she cannot. This is the paradox.

The puzzle clearly mimics the Grandfather Paradox. Following Lewis (1976), it is often maintained that such paradoxes are spurious because “can” is “equivocal”. I show how to develop this insight in order to solve the paradox I sketched. Here is a brief outline (which can be developed both in terms of indexical contextualism and in terms of *nonindexical* contextualism – à la MacFarlane (2009)):

- (P1) X can do Y =_{def} X’s doing Y is compossible with the relevant facts.
- (P2) Which facts are relevant is determined by the context.
- (P3) Gawd’s avoiding starting to whistle *All along the Watchtower* at t_2 is compossible with the facts s_1 we ordinarily count as relevant in saying what someone can do.
- (P4) Gawd’s avoiding starting to whistle *All along the Watchtower* at t_2 is not compossible with a more inclusive set of facts s_2 , which also counts among its members the fact that, at t_2 , Gawd will start whistling that song.
- (C) The fact that Gawd can avoid starting to whistle *All along the Watchtower* at t_2 is not necessarily inconsistent with the fact that she cannot; she can *relative to* s_1 , she cannot *relative to* s_2 .

Let us suppose that something like this can do the job. It is then clear that the fact that, at t_1 , Gawd foreknows what she will be doing at t_2 has no bearing on what she will be able to do at t_2 . However, this fact has important consequences for the way Gawd sees herself. If Gawd had no foreknowledge of what she will be doing at t_2 , she would see herself as free to choose whether to start whistling or not. But if Gawd has such a foreknowledge, then things look quite different. Seeing herself as free to choose whether to start whistling or not seems clearly incompatible with knowing that she will.

This incompatibility seems to be generated by a general principle:

It is impossible for X to believe at a single time (a) that it is certain that a state of affairs S will obtain, and (b) that he is at liberty to bring about S, or not-S as he chooses [...]. (Horwich 1975: 437)

In the final part of the paper, I defend the principle from Horwich’s criticisms.

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7.2 The Humean Supervenience Thesis and the Metaphysics of Causation

Frederik Nef (Institut Jean-Nicod, CNRS-ENS-EHESS)

«We are Humean about value, but not about causation» proclaimed the Credo of the Camberra Planers, as formulated by Daniel Nolan in 1996 – Me too. The Humean Supervenience Thesis is both central and elusive in David Lewis’ metaphysical system. I propose first to examine and make explicit the precise impact of this thesis concerning the relations or absences of relations between events or states of affairs and second to confront it with the Lewis’ late theory of causality in “Causation as influence”, and “Void and object”. I shall discuss the relevance of the supervenience of individuals upon points of space-time relatively to a theory of causation that tries to overcome the shortcomings of the pure counterfactual dependence between events. I shall defend an intrinsicist view of causation and contemplate the possibility of a connective one, wondering if it would be compatible with the theoretical frame of general supervenience. In *Causation, a Realist Approach*, Michael Tooley criticized the Humean Supervenience Thesis as regards causation and Peter Menzies criticized too this principle, but then as regards chance, from the point of view of a probabilistic theory of causality. D. Lewis tried to remedy these criticisms in what we can call a second theory of causation, which attempts to be both broader and more flexible than the first one, a counterfactual theory of causal regularities. But the singularist and non-reductionist conception defended by Armstrong constitutes a serious alternative even to this enlarged version of causation. However non-reductionist singularism faces at least two metaphysical difficulties. If it has to take into account the causal power of absence and void, how to individualize such absences and voids?

If we admit in a realist stance a connection *de re* between the cause and the effect, what is the difference between this connection – “an unbroken process connecting cause with effect” (Menzies 1989: 654) – and (counterfactual) dependence?

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7.3 A modal realist defense of presentism

Michael De (University of St Andrews)

David Lewis held that “absolutely every way that a world could possibly be is a way that some world is” (Lewis 1986). One way the world could be is the way it was in 400 BC. It follows, according to modal realism, that there is such a possible world. In that world there is a perfect duplicate of the actual Socrates of 400 BC who shares with him the same relevant extrinsic properties. (We may go so far as to require the two be indiscernible in the sense of Lewis, though we needn’t.)

Just as when I say that I could have had pancakes this morning for breakfast I’m really talking about one of my counterparts, when I say Socrates was wise I’m really talking about one of these other-worldly duplicates. The similarity between tense and modality and in particular times and worlds – a similarity observed by Prior, Fine, Zalta, Markosian and others – is here taken in its most serious form whereby similarity is identity and *times just are worlds*. One already sees this at the formal semantical level, though I don’t think this observation carries much philosophical weight.

Why is any of this important? Because it has profound philosophical implications. The modal realist has at her disposal – and for *free* – a powerful argument for presentism, the thesis that all that exists is present. The argument is so powerful that it avoids all of the major objections to most defenses of presentism. In particular, it avoids the following objections.

1. *The argument from singular propositions.* A singular proposition expressed by a sentence of the form ‘S is P’ is a proposition that contains as a constituent, or directly refers to, S. There are singular propositions about the past (e.g. ‘Socrates was wise’). Therefore presentism is false.

2. *The argument from relations.* If a relation holds between some things, then all of those things, the relata, must exist. Relations hold between non-present things and present things (e.g. between Socrates and myself since I do admire the man). Therefore presentism is false.

3. *The argument from causation.* Events are constructed out of existing things. For example, the event of John's loving Jane consists (perhaps among other things) of John and Jane. It is true that some present events are caused by past events. If at least one relatum of the causation relation exists, then so does the other. Present events exist, thus so do past ones. Therefore presentism is false.

4. *The argument from truthmaking.* Every truth has a truthmaker, i.e. an existing object on whose existence the truth depends. There are truths about the past such as that Socrates was wise. But the only plausible truthmaker for that proposition involves Socrates. Therefore presentism is false.