

A Semantic Model for Causation in Criminal Law and the Need of Logico-Legal Criteria for the Attribution of Causation*

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Abstract: Causation as an element of a criminal offence is different from the probative difficulties. The empirical laws that are relevant to the proof of causation, as a pure matter of fact, are not discussed here, but only causality as a category of our understanding and a general law of the intelligible world. This general law of causality is equally valid for all result crimes (e.g. homicide, bodily harm, deception offences and criminal damage). According to the European continental theory of conditions, any *conditio sine qua non* is by itself a cause. Causation is established by the formula of *conditio* (similar to the so-called ‘but for’ test in the common law), which corresponds to a counterfactual reasoning. However, that formula is not able to resolve adequately those cases of causal overdetermination where the result occurred by means of actions of multiple, independently intervening agents. A semantic model of the world evolution, based upon ramified temporal logic, may assist the comprehension of causal connections between human actions and the relevant results. At the end of the day, this model allows us to understand that, even in situations where no kind of factual uncertainty is present, doubts upon the attribution of causation to specific agents remain. We shall conclude that the attribution of causation is not a natural problem, but a logico-legal one, that has to be dealt with by way of logico-legal criteria. Nevertheless, attribution of causation must be clearly distinguished from objective imputation of proscribed harm.

Keywords: *causation, formula of conditio, counterfactuals, attribution of causation, objective imputation.*

* Translated from the Portuguese by André Hoelzer.

1 Introduction

1.1 Causation in law

The commitment of various types of offences depends on the verification of an event that is distinct from human conduct, which can be dissociated from it in time. Let us consider, for example, homicide, which is not complete unless the victim's death occurs. The legal science of Germanic origin reserves the name result crimes (*Erfolgsdelikte*) for this kind of offences¹. A certain objective relationship between the preceding conduct and the so-called typical result (*tatbestandsmäßiger Erfolg*) has to be established, at least a *connection that obeys the law of causality*. According to the theory of conditions (*Bedingungstheorie*)², which is still largely established in the German legal science and case law³ and also in other countries like Portugal, *cause means any condition without which a given result would not have occurred*⁴.

¹ Cf. Hans-Heinrich Jescheck, and Thomas Weigend, *Lehrbuch des Strafrechts, Allgemeiner Teil*, p. 260 (5th ed., Duncker & Humblot, Berlin, 1996).

In this paper we will only consider criminal offences by action (*Begehungsdelikte*). We will not enter the field of criminal offences by omission (*Unterlassungsdelikte*, cf. Jescheck & Weigend, *op. cit.*, p. 265), although there may appear equally problems of causation or, at least, of quasi-causation, with a view to the need of configuring the action that would have avoided the result (cf. Luís Greco, *Kausalitäts- und Zurechnungsfragen bei unechten Unterlassungsdelikten*, 8/9 ZIS 674-675 [2011]).

² The theory of conditions is also known as equivalence theory (*Äquivalenztheorie*) since to each and any condition of the result the same importance is attributed.

³ The theory of equivalence became constant case law of the German Imperial Court of Justice (*Reichsgericht*), which lasted until 1945, and would also be embraced within the case law of the Supreme

No result crime, be it intentional or negligent, can be mistaken for mere causation of a result. The expression ‘killing another person’, for example, has a more restrictive meaning than just ‘causing the death of another person’. In fact, the cause-and-effect nexus (in terms of the theory of conditions) is a necessary, but not sufficient element for the responsibility of the defendant for a completed result crime.

Causation as an element of criminal offence must not be confounded with the related probative difficulties, e.g. with the characteristics of the injuries detected on the victim’s

Federal Court (*Bundesgerichtshof*) up to now (cf. Urs Kindhäuser, *Zurechnung bei alternativer Kausalität*, 3 GA 134, fn. 2 [2012]).

⁴ At present, the invention of the equivalence theory is correctly and widely attributed to the Austrian Julius Glaser (the original formulation of the theory appears in his Julius Glaser, *Abhandlungen aus dem Oesterreichischen Strafrecht*, Vol. I, 2. Abh., p. 298 [Tendler & Comp., Wien, 1858]). Precisely for this reason, the German Maximilian von Buri lost the perduring but undeserved fame of being the founder of that theory. Nevertheless, it is perfectly legitimate to say that von Buri had merit that is not to be underestimated, even though he never paid tribute to Glaser (cf. Federico Stella, *Leggi scientifiche e spiegazione causale nel diritto penale*, p. 5, fn. 4 [2nd ed., Giuffrè, Milano, 1990] where this is stressed in a censorious tone), since it was he who took charge of developing and perfecting systematically the equivalence theory from 1860 on (a substantial amount of traditionally quoted studies of von Buri on the problem of causation appears in the following compilation, which additionally contains the full list of the author’s essays until the year of 1893 (Maximilian von Buri, *Beiträge zur Theorie des Strafrechts und zum Strafgesetzbuche*, *Gesammelte Abhandlungen* [Veit, Leipzig, 1894]).

At times it has been said, not without maliciousness, that the constant application of the equivalence theory in criminal matters by the *Reichsgericht* existed just because von Buri brought in his influence on the Council of the *Reichsgericht* (*RGRat*) in his capacity as member of that organ (in this respect, cf. Wilhem Sauer, *Allgemeine Strafrechtslehre, Eine lehrbuchmäßige Darstellung*, p. 81 [3rd ed., Walter de Gruyter, Berlin, 1955]). However, the endurance of the equivalence theory for more than a century upon the pedestal of case law demonstrates that this never would have been possible merely due to personal interest at play, moreover of persons already outdated and surpassed.

body. Therefore, we will not treat the *empirical laws* of causation that are relevant to the determination of, for instance, the lethality of the injuries inflicted on a victim of a homicide. Instead, we will treat causality as a *category of understanding* and *general law of the intelligible world*. That general law of causality is equally valid for all types of result crimes (homicide, bodily harm, deception offences and criminal damage).

1.2 The formula of *conditio*

According to the theory of conditions, any fact without which the result would not have occurred is a *condition*, which is moreover *equivalent* to any other condition, and is valid singularly as *cause*, exactly like any other condition.

The determination of a causal nexus between a basic action α (carried out by agent i) in a moment t_0 , and the occurrence of an event A , in a moment t_1 , implies the following two aspects (which are considered jointly as ‘formula of *conditio*’):

i) A *factual verification* that at the present moment (the instant of which is supposed to be ulterior to t_1) and according to available information, it can be said that A took place at t_1 and that basic action α was executed by agent i at t_0 ;

ii) A *hypothetical counterfactual reasoning*, that is, an operation that consists of mentally eliminating the basic action α , which apparently has conditioned the event A that occurred at t_1 , in order to reveal if, when absent, the event would not have happened, in the same instant.

In case of positive response to i) and ii) it is demonstrated that α was a *conditio sine qua non* of A at t_1 .

Yet in the case of positive response to i) and negative response to ii) – that is, the mental elimination of the basic action α would not prevent the occurrence of event A at t_1 – the *conditio* is not confirmed. This alone does not demonstrate the lack of causal efficacy of the basic action α with regard to the occurrence of event A at t_1 . We may indeed face situations of causal overdetermination, wherein another cause – be it virtual or concurrent – would have been sufficient to provoke the occurrence of event A at t_1 , in the absence of the basic action α . In these situations, we must optimize the formula of the *conditio*, otherwise we may not be able to demonstrate the causal efficacy of basic action α . That, in its turn, would hinder the responsibility of the accused for the completed crime, leaving only the possibility to convict the defendant for attempt, in case of intention, or nothing at all, in case of negligence⁵.

We will use $|(\alpha, i, t_0) \twoheadrightarrow (A, t_1)|$ to abbreviate the assertion that there is a causal nexus between the action α , carried out by agent i , in the moment t_0 , and the truth of A in the moment t_1 (where A is a sentence, like ‘j is dead’, describing the effects of the occurrence of an event, the ‘death of j’ in such case), where it is assumed that such causal nexus is determined according to the previous theory.

2 A semantic model of the world evolution

2.1 A model of the particular case

⁵ It is not necessary to discuss if the reckless attempt is punishable, all the more because in this matter the Anglo-American law is different from the European continental law (e.g. German and Portuguese law system), where the attempt is punished on the basis of *dolus eventualis*.

The purpose is not to define a new logic⁶, nor to establish formal deductive mechanisms that can be applied to the analysis of actions, results and cause-and-effect nexus. Our intention is simply to define a semantic model that – accompanied as it is by the habitual informal reasoning made by legal practitioners (suggested on the one hand by their own common sense and, on the other hand, by the previous comprehension of the legal problem) – may allow for a systematization of reasoning necessary for establishing a causal nexus, according to the underlying theory.

⁶ A lot of logics have come to be introduced in the field of analysis and representation of actions, results and the respective cause-effect relationships. To start with, Georg Henrik von Wright, *Explanation and Understanding*, p. 50 (1st paperback ed., Cornell University Press, New York, 2004 [1st ed., 1971]), should be referred for fairness sake. We may also remind some first-order temporal logics, so-called fluid and event-based. Or some modal logics where an operator *sees to it* is included in order to establish a relationship between the action of a person and the change in the state of affairs, but without an explicit reference to the particular executed action: for example, cf. Stig Kanger, *Law and Logic*, 38 THEORIA 105-132 (1972); Lars Lindhal, *Position an Change: A Study in Law and Logic* (D. Reidel, Dordrecht-Holland/Boston-USA, 1977); Ingmar Pörn, *Action Theory and Social Science: Some Formal Models* (D. Reidel, Dordrecht-Holland/Boston-USA, 1977); Nuel Belnap, *Backwards and Forwards in the Modal Logic of Agency*, 2 PHILOSOPHY AND PHENOMENOLOGICAL RESEARCH 777-807 (1989); Brian Chellas, *Time and Modality in the Logic of Agency*, 51 STUDIA LOGICA 485-517 (1992), and Risto Hilpinen, *On Action and Agency*, in E. Ejerhed, and S. Lindstrom (eds.), *Logic, Action and Cognition: Essays in Philosophical Logic*, pp. 3-27 (Kluwer, Dordrecht, 1997). Or even the so-called dynamic logics, stemming from the computer science, where explicit reference is made to the accomplished actions and an operator is introduced in order to describe the immediate effects of any action: for example, cf. David Harel, *Dynamic Logic*, in D. M. Gabbay, and F. Günthner (eds.), *Handbook of Philosophical Logic*, Vol. II, pp. 497-604 (D. Reidel, Dordrecht-Holland/Boston-USA, 1984). We will not focus those logics here: for an general perspective over the action logics of the kind *sees to it*, cf. Filipe Santos, and José Carmo, *Indirect Action, Influence and Responsibility*, in M. Brown, and J. Carmo (eds.), *Deontic Logic, Agency and Normative Systems*, pp. 194-215 (Springer, Wien/New York, 1996).

Our model can thus be no more than a *model of the particular case*, which we can furthermore designate as *pragmatic*. However, it must be based upon an *abstract* formal semantic model for representation of the evolution of the world, completely independent of any particular case. Subsequently, we start with the presentation of the abstract model and set out to discuss briefly its potentialities for incorporation of *modal temporal concepts*⁷.

The proposed abstract model may be considered an oversimplification of the reality, but we think that it captures the features that we think are fundamental for the analysis of these types of cases by the legal practitioners⁸.

2.2 Time structure in the model of world evolution

In accordance with our intuition, the world exists in time and is made up of change, in view both of actions accomplished by multiple agents (persons) and of occurrences of other events⁹ (which we can characterize as nature interventions). Therefore the state of the world may vary from one *instant* to the other.

At each *moment* past and present are defined and unchangeable, but future is open. But not even this prevents us from conjecture about what is going to happen (to become

⁷ Following the path of G. H. von Wright, *op. cit.*, p. 50.

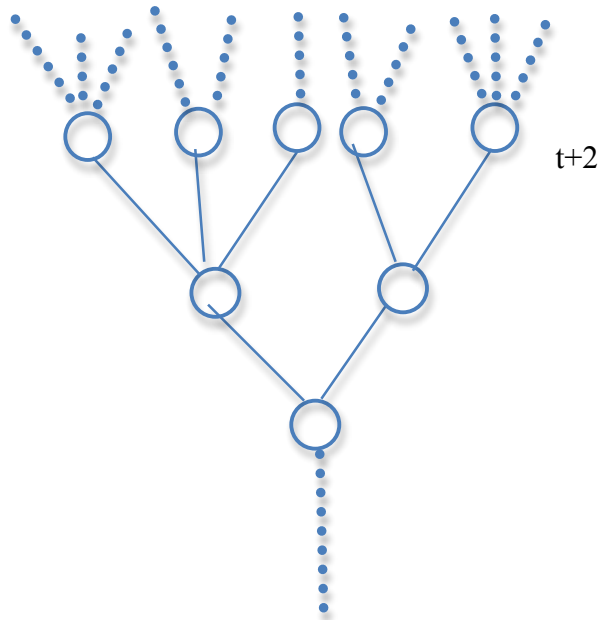
⁸ Much more complete formal models have been proposed for the analysis of causality. On this subject a particular reference should be made to Lennart Åqvist, and Philip Mullock, *Causing Harm: A Logico-Legal Study* (Walter de Gruyter, Berlin/New York, 1989). We think however that this remarkable work has not received the attention it deserved in the legal community, in part precisely because of the complexity of the proposed model.

⁹ We shall not deal with the question whether actions are events, as Davidson states (cf. Donald Davidson, *Essays on Actions and Events* [Clarendon Press, Oxford, 1982], especially pp. 105-148).

t
 $t+1$) in a certain instant t' ulterior to the present instant (let us designate as) t , assuming that between t and t' certain events had been reported; not even does it prevent us from conjecturing about what *necessarily* or *possibly* is going to happen in future.

2.3 The tree of world evolution

Thus we may see the models as tree-like structures, where at each moment the past is linear and there exist open future branches.



Although time is continuous, we may assume that we only have report of what (relevant) has happened, that has changed the state of affairs, in a discrete set of points or moments in time. So, for practical purposes, we may consider a discrete time, isomorphic to the set of the integer numbers. Moreover, although we may assume that time is infinite (both with respect to the past and to the future), for our case analysis we only need to report part of the relevant tree structure, and, in particular, we may consider that it starts, i.e. that the tree has a root, at the moment t_0 where it took place

the action α , carried out by agent i , whose consequences we want to analyse. Typically, we will refer such instant as instant 0.

We may see a history (or a trajectory) as a complete branch in the tree and we will identify each moment with reference to the history to which it belongs and to its instant: we will use $h(\tau)$ to represent the moment in history h at instant τ . Since a same moment may belong to different stories, the truth of some assertions, like assertions about the future, will depend not only of the moment we are considering, but also of the history (to which it belongs) that we assume that will be followed. However, the truth value of simple atomic assertions about the state of affairs will depend only on the moment under consideration. Thus we could describe that some assertion A was true or false at some moment $m=h(\tau)$ by adding to such moment m , in the tree, the label, respectively, A and $\neg A$ (where \neg denotes the logical symbol for negation, i.e. $\neg A$ means ‘not A ’). However, not to make a graphical representation of trees too heavy, we choose not to include that information in the tree and describe it in the text.

On the other hand, as we have referred, the bifurcation of two stories at a moment m has to do with the execution of actions carried out by one or more agents, or with occurrences of other events, which we can characterize as nature interventions. When analyzing our cases, the transition from one moment to the next (on a history) may be labelled with pairs of the form (α, i) : this will mean that (although other actions might have occurred simultaneously) for practical purposes we may consider that such transition was caused by the execution of the action α by the agent i (if action α was carried out by a joint act of two agents i and j , then we can use $(\alpha, \{i, j\})$ as label). Finally, informally, we will use the label $\neg(\alpha, i)$ to indicate that agent i has not performed action α : in such transition, the agent i has performed actions different from

α , and actions that are not relevant to the analysis of the truth of the atomic assertions that describe the states of affairs under consideration (and, for that reason, we do not need specify which was the specific action that agent *i* has performed). We hope that this and other issues about our model will be clarified by the examples next.

3 Analysis of hard cases

3.1 Effective concurrency of causes

Cases of *effective concurrency of causes* (with *parallel authorship*¹⁰) are those where all actions *interact* (rather than counteract) towards the production of a given result.

a) The case of the glass of port wine (1st version)

It takes 10 milligrammes of a particular poison to cause the death of an adult, who in the present case is *Mr X*. *John* dropped 6 mg of poison in the glass of port wine, which is aimed at *Mr X*. *Anthony*, independently of *John*, dropped another 3 mg of the same poison. Subsequently *Francis*, also independently of the others, again added 6 mg of the same poison. *Mr X* drank the port, and died consequently¹¹.

¹⁰ The cases of effective concurrency of causes are particularly problematic if they are simultaneously cases of parallel authorship, because in this case it would be much easier to hold all the independent agents responsible for the production of the result (even though this is not unanimously accepted among the literature).

¹¹ The example and its variations presented here are based on a famous classic example invented by Traeger, which is the ‘case of the cook and the chambermaid’, where both dissolved, in the same glass destined to their lady, equal doses of a lethal poison, independently from each other (cf. Ludwig Traeger, *Der Kausalbegriff im Straf- und Zivilrecht*, p. 45 (Lippert, Marburg, 1929 [2nd reprint of the ed. 1904]). The reconfiguration of the case obeyed the necessity of introducing complicating factors that could help to problematize the determination and attribution of the various causal links.

Abbreviations in use: *stories*, or *trajectories of the world evolution*, and *designators for agents*, *basic actions* and *atomic assertions*

Stories/trajectories of the world evolution:

h1 – *history/trajectory 1*

h2 – *history/trajectory 2*

...

Agents:

j – *John*

a – *Anthony*

f – *Francis*

x – *Mr X*

Basic actions:

p3 – to drop 3 mg of poison into the glass of port wine

p6 – to drop 6 mg of poison into the glass of port wine

D – to drink the poisoned port wine

Atomic assertions:

glass (0) – there is a glass of excellent port wine

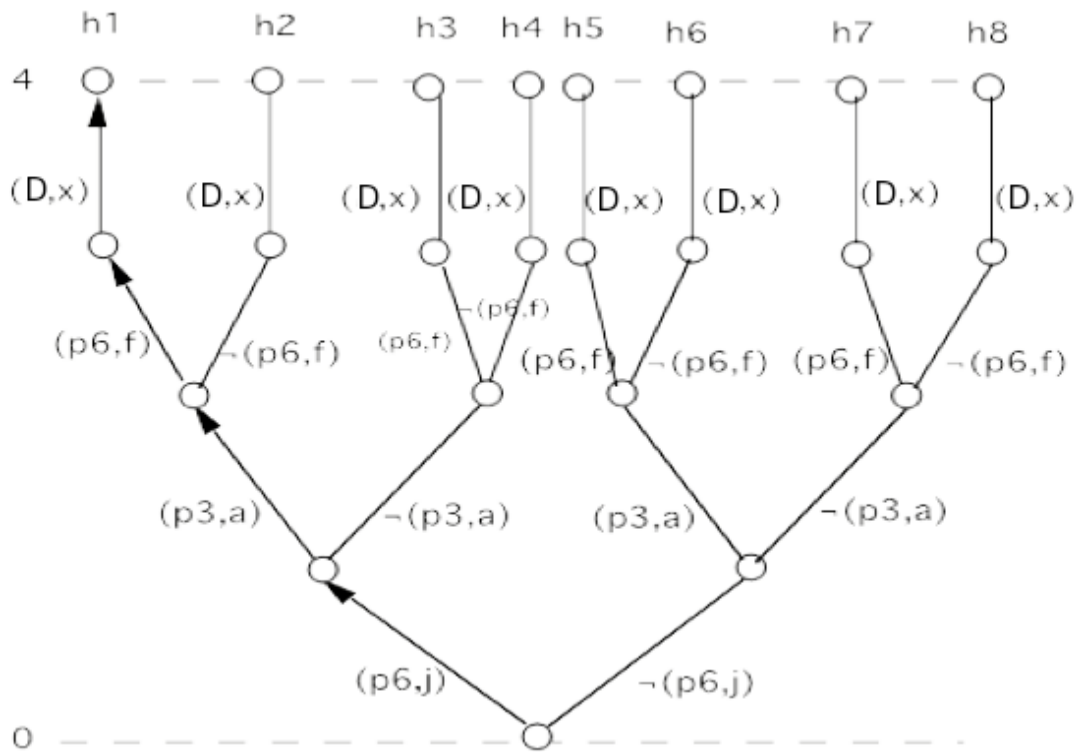
glass (3) – there is a glass with 3 mg of poison mixed with port wine

and generically

$\text{glass}(n)$ – there is a glass with n mg of poison mixed with port wine, and

$\text{dead}(x)$ – $Mr X$ is dead

Tree of the world evolution:



Current trajectory:

It is implicitly assumed that the current trajectory is $h1$, i.e. $h1$ is the trajectory *actually followed*.

Available information:

The present trajectory (h_1) is known and there is account on which basic actions were actually accomplished, as described in the tree.

There is also the following information about the state of affairs at moment $h_1(0)$ (that is the same moment as $h_2(0)$, $h_3(0)$, ..., $h_8(0)$):

Moment $h_1(0)$: $\neg \text{dead}(x) \wedge \text{glass}(0)$

(where \wedge denotes the logical symbol for conjunction, i.e. \wedge means ‘and’). That is, at the initial moment under consideration *Mr X* is not dead, and there is a glass of excellent port wine.

PROBLEM I: $|(p_6, j, 0) \rightsquigarrow (\text{dead}(x), 4)| ?$

Translated to the natural language, the question is as follows: may the death of *Mr X*, which was observed at instant 4, have been caused by the fact that *John* introduced 6 mg of poison into the glass of port, at instant 0?

In order to answer to this question, the procedure is to see if the mental elimination of the execution of the action p_6 by the agent j would prevent the occurrence of the death of *Mr X*, which was observed at instant 4.

The relevant alternative trajectory is obtained supposing that, at the initial moment, the agent j does not carry out action p_6 , performing, instead, other actions not relevant for the case, and that all the other agents act as they did in the current trajectory.

The relevant alternative trajectory is h_5 .

According to the intuitive assumptions about the effects of the present actions we may conclude that the evolution of the state of affairs in the world would be the following on this alternative trajectory.

Moment $h5(0)$: $\neg \text{dead}(x) \wedge \text{glass}(0)$

(Basic action: *John* did not drop poison into the glass of port)

Moment $h5(1)$: $\neg \text{dead}(x) \wedge \text{glass}(0)$

(Basic action: *John* dropped 3 mg of poison into the glass of port)

Moment $h5(2)$: $\neg \text{dead}(x) \wedge \text{glass}(3)$

(Basic action: *Francis* dropped 6 mg of poison into the glass of port)

Moment $h5(3)$: $\neg \text{dead}(x) \wedge \text{glass}(9)$

(Basic action: *Mr X* drank the port wine and it is assumed that it was not beneficial to his health, but he did not die)

Moment $h5(4)$: $\neg \text{dead}(x)$

CONCLUSION: *Mr X* would not have died. The conclusion that the death of *Mr X* by intoxication was conditioned (= caused) by *John*'s action comes necessarily to mind.

In other words, a positive answer is given to the question if $|(p6, j, 0) \twoheadrightarrow (\text{dead}(x), 4)|$.

PROBLEM II: $|(p3, a, 1) \twoheadrightarrow (\text{dead}(x), 4)|$?

In natural language, the question goes like this: may the death of *Mr X*, observed at instant 4, have been caused by the fact that *Anthony* dropped 3 mg of poison into the glass of port, at instant 1?

The relevant alternative trajectory is now h3.

The relevant elements are now the following:

Moment h3(1): $\neg \text{dead}(x) \wedge \text{glass}(6)$

(Basic action: *Anthony* did not drop poison into the glass of port)

Moment h3(2): $\neg \text{dead}(x) \wedge \text{glass}(6)$

(Basic action: *Francis* dropped 6 mg of poison into the glass of port)

Moment h3(3): $\neg \text{dead}(x) \wedge \text{glass}(12)$

(Basic action: *Mr X* drank of the port wine and it is assumed that the consequence would be as follows:)

Moment h3(4): $\text{dead}(x)$

CONCLUSION: *Mr X* would have died anyway. Thus we cannot conclude that a causal filiation regarding the death by intoxication existed with respect to *Anthony*'s basic action.

PROBLEM III: $|(p6, f, 2) \twoheadrightarrow (\text{dead}(x), 4)|?$

In natural language, the question is: may the death of *Mr X*, observed at instant 4, have been caused by the fact that *Francis* dropped 6 mg of poison into the glass of port, at instant 2?

The relevant alternative trajectory is h_2 .

The relevant elements are:

Moment $h_2(2)$: $\neg \text{dead}(x) \wedge \text{glass}(9)$

(Basic action: *Francis* did not drop poison into the glass of port)

Moment $h_2(3)$: $\neg \text{dead}(x) \wedge \text{glass}(9)$

(Basic action: *Mr X* drank of the port wine, however it is expected that he did not die)

Moment $h_5(4)$: $\neg \text{dead}(x)$

CONCLUSION: *Mr X* would not have died. Thus the conclusion that his death by intoxication was caused by the basic action of *Francis* seems reasonable.

John and *Francis* both caused *Mr X*'s death, but we cannot assert that *Anthony* caused it too (even though we know empirically that the percentage of poison he added to the glass of port has interacted with the others while producing the victim's death through intoxication).

It is therefore clear that (i) in a situation that does not bear any kind of factual uncertainty, and (ii) where all the agents in fact contributed, by means of their respective actions, to the occurrence of *Mr X*'s death, even so (iii) the attribution or not of causation to each of them will be different, notwithstanding (iv) each of them having added a certain amount of poison that solely would not have been sufficient to produce the victim's death. In fact, (i, ii) the cause of *Mr X*'s death on the present trajectory h_1 (i.e., the *actually followed* trajectory) is perfectly identified, that is, a portion of 15 mg of poison contained in the glass of port. In the same way, (ii) the doses of poison

administered by each of the agents are also identified. So it is known, in this context, (i, ii) what caused the death of *Mr X*, based upon our knowledge of the empirical laws of causation. We know, too, (iii) who caused his death, by applying the positive formula of *conditio*, which is here illustrated in form of our tree of world evolution. The positive formula of *conditio* thereby fulfils the function of allowing (iii) the *attribution of causation* to each of the agents, according to the relative differences between several individual contributions. These differences are in fact relevant and not arbitrary, in spite of (iv) each of the agents having added a percentage of poison to the glass of port that by itself would not be sufficient for the causation of the victim's death. We may also say that the positive formula of the *conditio* is able to disclose one aspect of causality as a category of understanding, which long after that would be seconded by the philosopher Mackie by his definition of cause with the *inus* condition¹². That is, an action is cause if it constitutes an insufficient, but not redundant part of a causal sequence as a whole. Now the basic action of *John* and *Francis*, taken one by one, are *inus* conditions for *Mr X*'s death, but this is not the case with *Anthony*'s basic action, which was a merely redundant part in the causal sequence.

As for result crimes, the attribution or not of causation to an agent allows the judge to proceed to an immediate distinction of cases of potential responsibility for a completed crime in relation to those where there is not more than responsibility for an attempt. In the present case, *Anthony* can at most be held responsible for attempt, since it is not possible to attribute the cause of *Mr X*'s death to him.

¹² Cf. John L. Mackie, *The Cement of the Universe: A Study of Causation*, p. 62 (1st ed., Clarendon Press, Oxford, 1980).

But does this mean that the logical consequence of the fact that *John* and *Francis* have caused individually the victim's death is that they should be punished individually, one apart from the other, for being the immediate and individual perpetrators of the homicide?

This would be the case if 'killing a person' meant the same than 'cause the death of a person', be it intentionally, recklessly or negligently. However, a blind causation is nothing more than the insurmountable limit of imputation of a result to an agent.

In the legal framework of German origin the attribution of a cause to a specific agent is followed by the verification of criteria according to the so-called theory of objective imputation (*Theorie der objektiven Zurechnung*). It is generally accepted that this theory is not a theory of causation¹³. Several criteria are included therein, from the demand of a certain degree of foreseeability with respect to the occurrence of a typical result (i.e., the adequate cause or adequacy theory)¹⁴ to the inclusion of this result in the kind of risk produced by the agent and by means of which his conduct is considered as according to a type crime (*Deliktatbestand*)¹⁵. In the Anglo-Saxon legal science and case law frequently test of 'foreseeability' and of 'harm within the risk' are included in the scope of the concepts known as 'legal cause' and 'proximate cause'¹⁶. The point is not to

¹³ Since Karl Larenz, *Hegels Zurechnungslehre und der Begriff der subjektiven Zurechnung: Ein Beitrag zur Rechtsphilosophie des kritischen Idealismus und zur Lehre von der 'juristischen Kausalität'* (Scientia Verlag Aalen, Leipzig, 1970 [fac-simile of the ed. Scholl, Leipzig, 1927]).

¹⁴ Regarding the adequacy theory, cf. Herbert L. A. Hart, and Tony Honoré, *Causation in the Law*, pp. 465-497 (Clarendon Press, Oxford, 2002 [1st reprint of the 2nd ed., 1985]).

¹⁵ Claus Roxin, *Strafrecht, Allgemeiner Teil*, Vol. 1, § 11, p. 343 ff. (4th ed., Beck, Munich, 2006).

¹⁶ Michael A. Carrier, *A tort-based causation framework for antitrust analysis*, 77 (3) ANTITRUST LAW JOURNAL 1009 (2011).

discuss words, but even though it should be pointed out that these English expressions are not well chosen, as they induce to think that we are still treating with problems of causation in law, while in reality we are already dealing with the capacity to control the events, which allows us to consider the result as an agent's deed. We are not talking about a strong control of the events, in the sense of an equivalence between the materialization of the agent's forecast and his will (crime is not an artistic production); it is a weak control we are talking about, in so far as it was within the agent's possibility to avoid the result. Why is a weak control of the events sufficient? Because the law does not make strict requirements to the persons on this level, it only demands that they hold back from harming others, what can be done with the minimum effort as to not create dangerous situations.

Since the criminal responsibility of each of the agents is being assessed, and no concerted effort between the two has happened – rather, there is parallel authorship with lack of knowledge of the reciprocal actions –, the statement that both contributed to the production of the result would not have any practical significance, because certainly to none of them the responsibility for the other's action can be imputed. The solution of cases like these, on the contrary, demands considering that each agent would respond only for attempted homicide (which legal kind of homicide can be applied is not important for now). Moreover, this would be an inadequate attempt (*untauglicher Versuch*) because the employed means would be insufficient to produce the death of the victim, although such an attempt is considered punishable pursuant to the German and Portuguese legal systems, as long as that insufficiency is not apparent *ex ante*. One could argue that the cases of effective concurrency of causes are materially different than cases of attempt, since in the former the typical result actually occurs, while by definition this does not happen in the latter. This is true, but the difference lies in the

causation level, not the imputation level. As far as objective imputation of the typical result is concerned, it is more relevant to know if the agent created any deadly risk that became concretized in the result, and we already have seen that the answer is no, given that without the additional doses the death of the victim would not have occurred.

Certainly the solution of the case would be quite different if *John* and *Francis* had acted as joint principal offenders, because then they should be held responsible for completed homicide.

The solution would be different too if only one of the agents had understood the plan of the other. In this case, if we assumed that *Francis*, knowing that *John* had dropped into the glass of port a dose of poison that was insufficient to cause the death of *Mr X*, came to collaborate on the criminal plans already underway, without telling anything to *John*, and poured in the same drink the amount that was necessary to produce a lethal effect. Once *Mr X*'s death had been observed, *John* should be punished as agent of an inadequate attempt of homicide, and *Francis* as agent of a completed homicide¹⁷.

All these are criteria of objective imputation and determination of authorship that go far beyond the attribution of causation.

b) The case of the glass of port wine (2nd version)

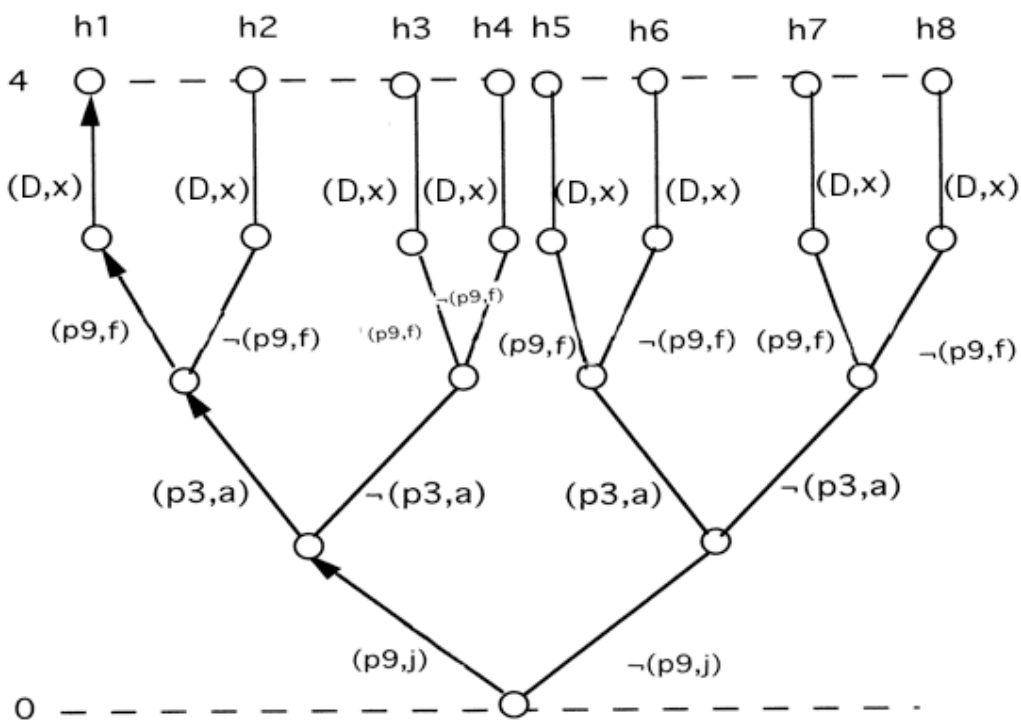
It takes 10 mg of a particular poison to cause the death of an adult. *John* dropped 9 mg of poison in the glass of port, which is intended for *Mr X. Anthony*, independently of *John*, dropped another 3 mg of the same poison. Subsequently *Francis*, also

¹⁷ In this perspective, cf. Maria da Conceição Valdágua, *Início da tentativa do co-autor: Contributo para a teoria da imputação do facto na co-autoria*, pp. 146-147 (Danúbio, Lisbon, 1986).

independently of the others, again added 9 mg of the same poison. *Mr X* drank the port, and died consequently.

The agents are as in the first version, and the meaning of the basic actions (now p_3 , p_9 and D) and of the atomic assertions is similar to those in the first version.

Tree of the world evolution:



If we applied the usual heuristic (i.e., the formula of *conditio*) in this version of the ‘case of the glass of port’, we would encounter a total impossibility of drawing conclusion whether there exists a causal link between each of the mentioned basic actions, considered separately, and the death through poisoning of *Mr X* (it is worthwhile to remember, though, that this is not the same as declare the absence of empirical causation between the doses of poison and the victim’s death).

But let us have a closer look if there is any possibility for a causal attribution of *Mr X*'s death on the actually followed trajectory to any or some of the agents.

Our strategy to face the problem without abandoning the formula of *conditio* consists in considering *possible sets of basic actions*, in order to discover which should be the *smallest* of these sets that still is capable of clarifying *Mr X*'s death, which was concretely observed.

The |set of basic actions of the three agents| is evidently cause of the death of *Mr X*, since the victim would not have died if these three actions had not been executed. Thus the set $\{(p_9, j), (p_3, a), (p_9, f)\}$ explains the occurrence of *Mr X*'s death.

Let us look now for the possible *minimal sets* of basic actions still capable of explaining causally the specific death of *Mr X*. In other words, our purpose is to discover which are the smallest subsets of $\{(p_9, j), (p_3, a), (p_9, f)\}$ that still explain the occurrence of that death.

Let us think of subset $\{(p_9, j), (p_3, a)\}$: if we consider an alternative trajectory where none of these basic actions was accomplished, with only (p_9, f) occurring (i.e. trajectory h7), we have that *Mr X* would not have died in that instant. Therefore we have a subset that explains the occurrence of *Mr X*'s death.

Similarly the subset $\{(p_3, a), (p_9, f)\}$ explains the occurrence of *Mr X*'s death.

And the subset $\{(p_9, j), (p_9, f)\}$ also explains the death of *Mr X*.

If we were searching now for subsets of these subsets, then we would return to the usual circumstances of the application of the formula of *conditio*, and we would

conclude again that no particular subset of basic actions (i.e., constituted by only one basic action) is able to explain the occurrence of *Mr X*'s death.

With this in mind, we find that the smallest sets of basic actions capable of explaining causally the death of *Mr X* are the following: $\{(p9, j), (p3, a)\}$, $\{(p3, a), (p9, f)\}$ and $\{(p9, j), (p9, f)\}$.

What shall we do now? One thing is sure: it cannot be concluded that any of the basic actions by itself alone could explain the death of *Mr X*, nor can any of the basic actions be completely excluded from having caused *Mr X*'s death.

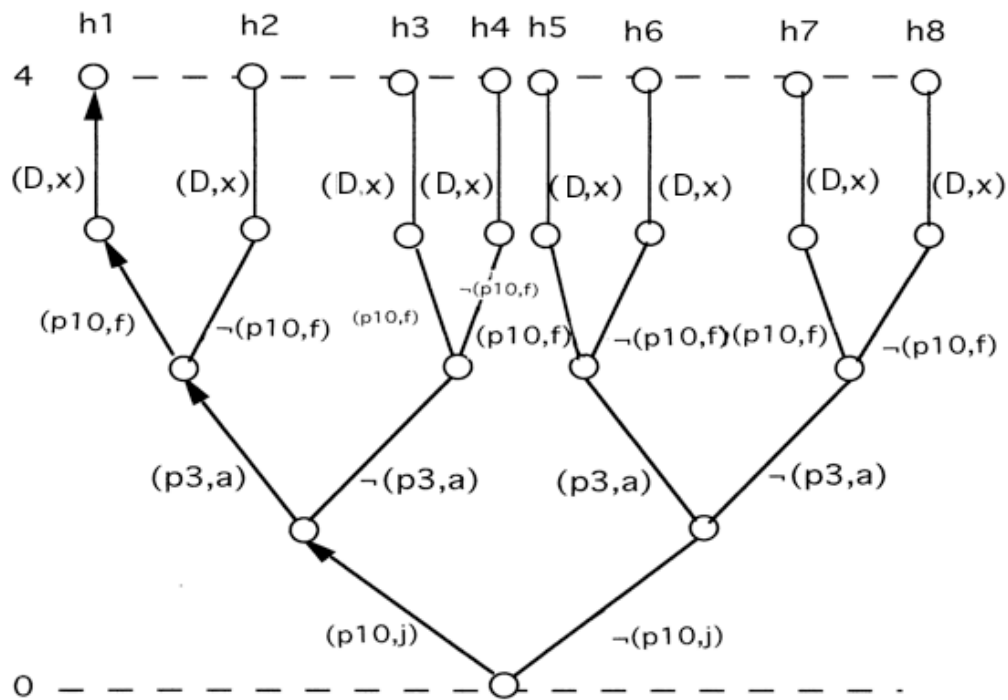
The attribution of causation should thus be made with reference to each of the agents. The distinctions, if existing, only may be established on the level of objective imputation of the result.

c) The case of the glass of port wine (3rd version)

It takes 10 mg of a particular poison to cause the death of an adult. *John* dropped 10 mg of poison in the glass of port, which is intended for *Mr X. Anthony*, independently of *John*, dropped another 3 mg of the same poison. Subsequently *Francis*, also independently of the others, again added 10 mg of the same poison. *Mr X* drank the port, and died consequently.

Again, the agents are as in the first version, and the meaning of basic actions (now p3, p10 and D) and atomic assertions is similar to those in the first version.

Tree of the world evolution:



The same strategy allows us to conclude that:

i) Set $\{(p_{10,j}), (p_{3,a}), (p_{10,f})\}$ explains the death of *Mr X*

ii) Set $\{(p_{10,j}), (p_{10,f})\}$ explains the death of *Mr X*

iii) But no other subset of $\{(p_{10,j}), (p_{3,a}), (p_{10,f})\}$ could explain the death of *Mr X*. Thus, in particular, (again) no particular action could by itself explain the death of *Mr X*.

The difference with respect to the before mentioned case (2nd version) is that now we find an explication that does not involve the action $(p_{3,a})$. Does this give grounds for a different proceeding with the attribution of causation?

The alternative heuristic, proposed hereafter seems to give a more solid foundation for an affirmative conclusion.

d) Alternative heuristic

The heuristic we complied with before in these cases of effective concurrence of causes is not the only possible. Our intention is precisely to explore several heuristics, in order to see which (if any) does reflect best the way of deciding the attribution of causation to one agent in particular.

The last version (3rd version) might be considered: we know that the set $\{(p10, j), (p3, a), (p10, f)\}$ explains the death of *Mr X*, actually observed.

Let us look for the smallest subsets that can explain the death of *Mr X*, as they are described in the following:

First it is checked if any single action, *in the absence of the other basic actions*, could explain the death of *Mr X*. If this is not the case, then we can start on with the analysis of sets of two actions, in order to see if, in the absence of the third basic action, any of these sets could explain the death of *Mr X*.

To be more concrete: let us consider action $(p10, j)$ and suppose that our trajectory included this basic action, but none of the other. *Mr X* would have died according to this trajectory (i.e., consider that a trajectory like h4 is our actual trajectory). On an alternative trajectory, where everything is similar, but where *John* had not dropped poison into the glass of port (like in trajectory h8), *Mr X* would not have died. Thus $(p10, j)$ explains by itself *Mr X* death. The cause of *Mr X*'s death can therefore be attributed to the basic action carried out by *John*.

We come to the same conclusion regarding action $(p10, f)$.

Let us consider now action (p_3, a) and, similarly, suppose that our present trajectory included this action, but none of the others (i.e., consider h_6 as our actual trajectory). Now, *Mr X* would not have died on this trajectory, so that, in accordance with our heuristic, no causal nexus between this action and the death of *Mr X* could be identified.

Hence causation cannot be attributed to *Anthony* in the third version.

If we consider at this point the second version, we would still find the lack of a causal nexus between each action by itself and the death of *Mr X*. The smallest sets of actions that explain the death of *Mr X* are, according to this heuristic:

$\{(p_9, j), (p_3, a)\}, \{(p_3, a), (p_9, f)\} \in \{(p_9, j), (p_9, f)\}$.

Thus, in what respect the second version, there is no difference on the results obtained from the application of the two heuristics.

3.2 Additional overtaking cause

The cases included in the category of the *additional overtaking cause* raise difficulties that are comparable to those that are generally associated with the effective concurrency of causes (or contributory causes), which has been analysed before.

Let us analyse the riddle of the death in the desert: *John* ventured out into the desert. His survival was guaranteed by excursions to a water reservoir. *Anthony* poisoned the water reservoir. *Francis*, who was unaware of *Anthony*'s action, emptied out the reservoir. After a few days *John* is found dead in the desert¹⁸.

¹⁸ Adaptation of the case conceived by James A. McLaughlin, *Proximate Cause*, vol. XXXIX, 149(6) HARVARD LAW REVIEW 155, fn. 25 (1925).

Abbreviations in use:

Agents:

j – *John*

a – *Anthony*

f – *Francis*

Basic actions:

P – to pour |poison| into the water reservoir

E – to |empty| the reservoir

D – to open the tap of the reservoir to |drink| water and to fill his canteen (water bottle)

Atomic assertions:

res(water) – the reservoir contains potable water

res(poison) – the reservoir contains poisoned water

res(empty) – the reservoir is empty

disp(j, liquid) – there is liquid at *John*'s disposal

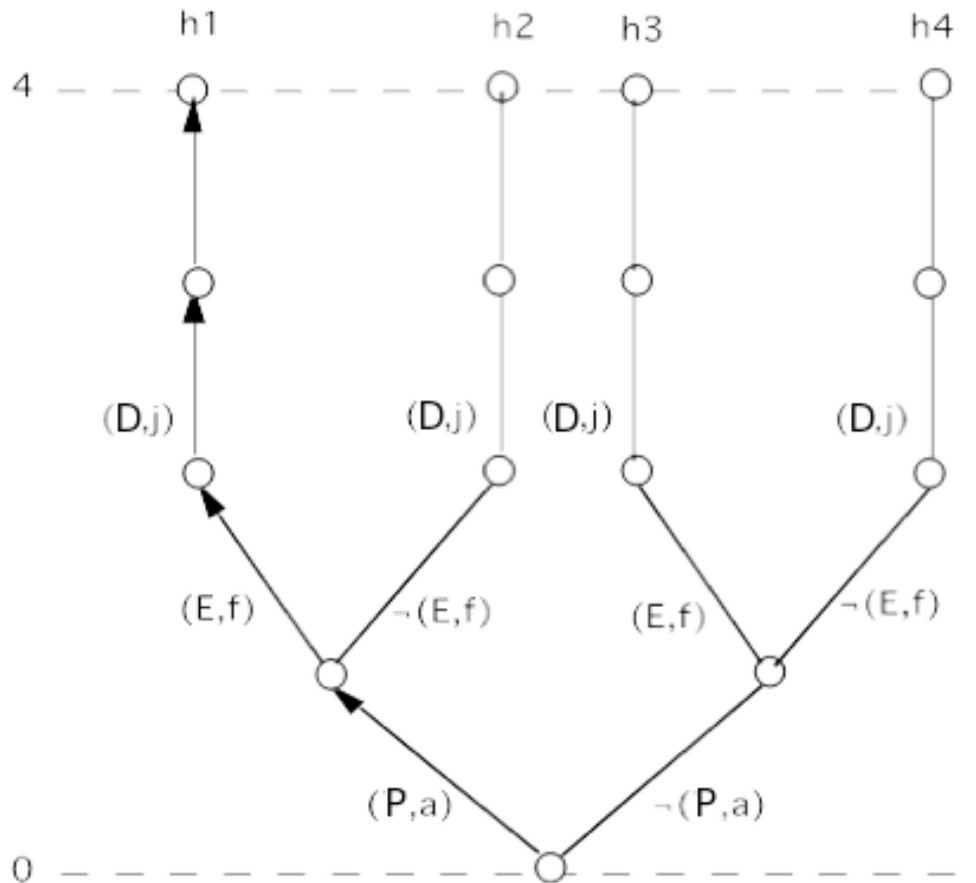
disp(j, water) – there is potable water at *John*'s disposal

drink(j, poison) – *John* drinks poisoned water

dead(j) – *John* is dead

$\text{dead_of}(j, \text{desid})$ – *John* is dead with signs of dehydration

Tree of the world evolution:



Observation: moments 3 and 4 should not be represented as one unique moment within the present trajectory h1 (worth to be mentioned, it is the trajectory *actually followed*), since this would suggest that *John* would have died immediately after his attempt to drink water (liquids). Yet the situation was not exactly like that, but rather as follows: *after a while*, the victim eventually died, not having succeeded to provide himself with water.

Available information:

The present trajectory ($h1$) is known and there is account on which basic actions were actually accomplished, as described in the tree.

There is also the information that the assertions $\neg \text{dead}(j)$ and $\text{res}(\text{water})$ are true at moment $h1(0)$, i.e. there is the information that, at such moment, *John* is not dead and the reservoir full of drinkable water.

Thus, regardless of *John* having water or not, in his canteen (water bottle), since he can actually rely on the reservoir full of drinkable water, we can conclude there is drinking water available to *John* at moment $h1(0)$, i.e. assertion $\text{disp}(j, \text{water})$ is also true. And so it is also true that there are liquids at *John*'s disposal. Therefore:

Moment $h1(0)$: $\neg \text{dead}(j) \wedge \text{disp}(j, \text{liquid}) \wedge \text{res}(\text{water})$

It is further known that at $h1(4)$ the assertion $\text{dead_of}(j, \text{desid})$ is true. Moreover, given that $\text{dead_of}(j, \text{desid})$ implies $\text{dead}(j)$, the assertion $\text{dead}(j)$ is also true, at $h1(4)$.

PROBLEM I: $|(P, a, 0) \twoheadrightarrow (\text{dead}(j), 4)| ?$

Rendered into natural language, the question is as such: was the dead of *John*, verified at instant 4, really caused by the fact that *Anthony* had poured poison in the water reservoir, at instant 0?

Observation: it is given as proven that *John* was dead at instant 4 and that *Anthony* poured poison into the reservoir at instant 0.

The relevant alternative trajectory is obtained supposing that, at the initial moment, the agent *a* does not carry out action *P*, performing instead other actions not relevant for the case, and that all the other agents act as they did in the current trajectory.

The relevant alternative trajectory is *h3*.

In accordance with intuitive assumptions about the outcomes of the basic actions considered, the conclusion that, according to this alternative trajectory, the evolution of the state of affairs would be as follows, is legitimate:

Moment *h3(0)*: $\neg \text{dead}(j) \wedge \text{disp}(j, \text{liquid}) \wedge \text{res}(\text{water})$

(Basic action: *Anthony* did not pour poison into the water reservoir)

Moment *h3(1)*: $\neg \text{dead}(j) \wedge \text{disp}(j, \text{liquid}) \wedge \text{res}(\text{water})$

(Basic action: *Francis* emptied out the water reservoir. We do not know if John has water in his canteen, or not. But after the action of *Francis*, we can assure that the reservoir is empty)

Moment *h3(2)*: $\neg \text{dead}(j) \wedge \text{res}(\text{empty})$

(Basic action: *John* opened the tap of the water reservoir to drink water and fill his canteen. At this moment we can state that there are no liquids at *John's* disposal)

Moment *h3(3)*: $\neg \text{dead}(j) \wedge \neg \text{disp}(j, \text{liquid}) \wedge \neg \text{drink}(j, \text{poison})$

Observation: at this moment, $res(empty)$ is still true, but according to our intuition it does not matter any longer for the analysis of the events verified in the following moments.

(Basic action: no relevant action; hence the normal course of events will imply that:)

Moment $h3(4)$: $dead(j)$

Conclusion: *John* would have died the same; thus there is no (better: we cannot conclude that exists any) causal filiation of |death of *John*| regarding the introduction of poison in the water reservoir (by *Anthony*).

All in all, the question if $|(P, a, 0) \twoheadrightarrow (dead(j), 4)|$ will have a negative answer.

PROBLEM II: $|(P, a, 0) \twoheadrightarrow (dead_of(j, desid), 4)|?$

If we proceed to a more detailed description of the event occurred at instant 4, it turns out again that we conclude that there is no causal filiation of |dead of *John* with signs of dehydration| regarding the introduction of poison into the water reservoir by *Anthony*.

That is the question if $|(P, a, 0) \twoheadrightarrow (dead_of(j, desid), 4)|$ will have a negative answer.

PROBLEM III: $|(E, f, 1) \twoheadrightarrow (dead(j), 4)|?$

Rendering once again into natural language, the question is the following: was the death of *John*, that occurred at instant 4, really caused by the fact the *Francis* has emptied out the water reservoir at instant 1?

The relevant alternative trajectory is now h_2 .

Observation: here the relevant initial moment is $h_2(1)$ and not $h_2(0)$. It should also be noted that the transition from $h_2(0)$ to $h_2(1)$ was accomplished by introducing poison in the water reservoir, and for this reason $\text{res}(\text{poison})$ at $h_2(1)$ is a true atomic assertion.

Therefore, on trajectory h_2 the following is observed:

Moment $h_2(1)$: $\neg \text{dead}(j) \wedge \text{disp}(j, \text{liquid}) \wedge \text{res}(\text{poison})$

(Basic action: *Francis* did not empty out the water reservoir)

Moment $h_2(2)$: $\neg \text{dead}(j) \wedge \text{disp}(j, \text{liquid}) \wedge \text{res}(\text{poison})$

(Basic action: *John* opened the tap of the reservoir, drank and refilled the canteen with water; assuming that it takes some time before the poison produces its effect, we may consider that at the moment subsequent to the accomplishment of the reported basic action the following results:)

Moment $h_2(3)$: $\neg \text{dead}(j) \wedge \text{disp}(j, \text{liquid}) \wedge \text{drink}(j, \text{poison})$

(Basic action: no relevant action; therefore the normal course of events implies that:)

Moment $h_2(4)$: $\text{dead}(j)$

Conclusion: *John* would have died anyway; consequently we cannot conclude that a causal filiation between $|John's \text{ death}|$ exists in relation to the emptying of the water reservoir (by *Francis*).

In sum, the question if $|(E, f, 1) \twoheadrightarrow (\text{dead}(j), 4)|$ has a negative answer.

It becomes clear that, while we do not have committed any mistake in reasoning, it cannot be said that this last conclusion (together with the answers to the previous questions) does conform to our intuitive and empirical representations: it is against the *principle of the sufficient reason* that something exists without any cause. In fact, according to its current formulation, the *principium rationis* states that *nihil est sine ratione* or, according to an also common positive formulation, *omne ens habet rationem*. All in all, each being has a reason for existence, without exception. So we cannot accept the conclusion that *John's* death happened without any cause. Nor can we accept, in another version of the same paradox, that the reason for the occurrence of the victim's death was the circumstance that he was alive before he died.

Perhaps we can evade this conclusion if we call into question the assumption of contemporaneity between the occurrence of *John's* death at trajectory h2 and his death at h1 (4). It is after all reasonable to presume that the poison, if it was in fact ingested by *John*, would have caused its effect in less time than it takes the process of dehydration to lead to his death. The difference of hours, or maybe days, between the compared occurrences would be sufficient to allow us to affirm that *John's* death would not have happened the same way if he was actually poisoned, since dying at *one* moment is not the same as dying at *another* moment. This time we would give way to the conclusion that after all *Francis* caused *John's* death in the moment that (*when*) he died. In other words, *Francis* gave a cause to the victim's death. Thus tribute would be paid to the principle of the sufficient reason.

Even more important than the verification of different moments of *John's* death in the several stories is the fact that emptying the reservoir implies a *delay* on the trajectory actually followed as compared to the death due to a hypothetical intoxication. As death is the unavoidable destiny of any living creature, it seems that causing death to

somebody has to be defined as shortening someones life, considering for that purpose the objective chances of life of the person concerned. But delaying *John*'s death is contradictory to the idea of causing his death. This aporia was identified by the legal theorists Hart and Honoré, who hence rejected that a causal process that had overtaken the virtual causal sequence could be considered as the cause of a death of someone who would be dead if this had not been the case. This arises from the following passages:

“The notion of causing death is not logically simple as might seem. Since everyone dies, ‘causing death’ involves the notion of shortening the span of life which the victim might normally expect and not merely determining the manner of dying: otherwise the concepts of ‘causing death’ and ‘prolonging life’ (i.e., enabling one to live to old age) would be indistinguishable. [...]. Accordingly [F] cannot be said to have caused [J’s] death; he has in fact removed one cause and secured that another cause (thirst) takes effect later. [...]. Otherwise it would seem that, though [A] and [F] were both guilty of attempting to kill [J], one by introducing a harmful substance into his body and the other by depriving him of an element necessary to life, their mutual frustration of each other’s plan precludes us from saying that either caused [J’s] death”¹⁹.

Let us comment on the solution and the arguments invoked by Hart and Honoré. From a viewpoint of the determination of the specific cause of *John*'s death, the arguments of either are, in our opinion, false. Let us have a closer look: the victim died and its death could not have happened without any cause. In spite of that, the opinion of the quoted authors implies, on the one hand, that on the actually followed trajectory, none of the agents would have caused the death of the victim all by himself nor, on the

¹⁹ Hart & Honoré, *op. cit.*, pp. 239-241; in square brackets, changes have been introduced that were necessary in order to adapt the commentary of the quoted authors to our case of the death in the desert.

other hand, would they have caused it in combination; because the action of one neutralizes the other's. If we furthermore excluded the possibility that the victim's death was originated by any other unnamed cause – and this is what we should do by force of the available data –, then the death would have been result of nothing.

Hart and Honore are perfectly aware of this, nonetheless they put their valuation of the meaning of 'to kill others' as a shortening of the life, which the victim wished to have, before the pure logic, instead of the meaning of the determination of the mode of dying²⁰. In other words, the quoted authors wanted to include axiological considerations in the attribution of causation, which – notwithstanding we ourselves recognize that causation is nuanced by the lens of the lawyer and therefore is a logico-legal problem and not only an ontological one – are of interest rather for a discussion about the value of human life, especially in the cases when the respective holder is unable to evade imminent death, with all plausible arguments considered (i.e., excluding the intervention of a *Deus ex machina*). Ultimately, this is about questioning the devaluation that corresponds to the destruction of life of a person already bound to die, by means of intrinsic or extrinsic circumstances. Hence we are dealing with a problem of definition of the material content of injustice in a homicide, in both its forms (consummated crime and attempt), and not a problem of attribution of causation.

²⁰ The semantic-axiologic understanding of the verb to kill as shortening one's life is also quite widespread among the German literature (under this viewpoint, cf. Erich Samson, *Hypothetische Kausalverläufe im Strafrecht: Zugleich ein Beitrag zur Kausalität der Beihilfe*, p. 97 ff. [Metzner, Frankfurt a. M., 1972]; cf. also Armin Kaufmann, *Objektive Zurechnung' beim Vorsatzdelikt?*, in Theo Vogler [ed.], *Festschrift für Hans-Heinrich Jescheck zum 70. Geburtstag*, pp. 254-255 [Duncker & Humblot, Berlin, 1985]).

We disagree with the opinion of Hart and Honoré. In our opinion, the resolution of the ‘case of the death in the desert’ can only be addressed by an effective attribution of causation to no more than one agent. However, we only know to whom if we go further into detail with the description of *John*’s death. So we have to include some relevant aspects in this description of the victim’s death, which *occurred* at h1 (4).

But this step cannot be done without objection, as we shall see right away. Let us start with the following observation: it is not possible to extract more information from an occurrence than simply *denoting* the occurrence in concrete terms and then giving a *description* of the event in abstract terms. Nothing else needs to be said, if these two operations were accomplished, namely denote and describe (in the present case, the event |*John*’s death|).

Now, in the light of this, which is the data set that has to fit the denotation of the occurrence (i.e., the clear determination of its *individual* and *unique* character)? It is impossible that the denotation of the occurrence of event |*John*’s death| contains more than indication of the place (*where did he die?*) and of the occasion (*when did he die?*). Along this way we may not go very far in our quest for arguments in order to resolve the case. Indeed the data is well known and was already taken into consideration: we always knew that *John* died in the desert and that *each of his possible modes of death* was observed in *each moment linked to instant 4* (obviously in the trajectories where the death was observed, that is, all except for h4 (4)).

As no incertitudes remain regarding the denotation of the occurrence, let us now come to the description of the event. Is the description by means of the word ‘death’ sufficient, or can we characterize the event still more exactly? It is not a matter of dispute that, attending to the laws of homogeneity and specification, we are able to

create, starting from a certain sort of things (here and now the event |*John's death*|), species of things that are therein included. Nonetheless we still obtain new collective descriptions (as long as they continue to bring together individual entities).

The specifications we are looking for are those where some tangible aspect of the event |death of person| are mentioned. Having this in mind, maybe we are able to refer to the *mode* of the occurrence (*the mode how he died*) under the present hypothesis, especially at h1 (4). In short, we could make it clear that on the actually followed trajectory the victim |died of dehydration|. But then it could be said that we were begging the question, because the preposition ‘of’ already means the same than indicating the cause, and that is exactly what we want to know. This critique is pertinent and we cannot avoid it, unless we decided on describing the victim’s death not as |death (caused by) dehydration|, but as |death *with signs of dehydration* detectable on the corpse|. However, by virtue of this redrawing of the event’s description it seems that now we only come to stumble at a new problem: according to a strong tradition rooted in David Hume, we never will see anything in the effect that denounces in the particular case its cause, and we can only understand the diversion of the effect starting from its cause based upon the empirical observation of constant conjunctions between phenomena of the sort of effect and those of the sort of cause (in other words, the simple *regularity* of the associated phenomena instead of the *perceptible efficacy* of the cause related to the effect)²¹. By exposing the event as being a |death with signs of dehydration| it looks like we were undermining that Humian tradition. In fact we believe

²¹ In his first *Enquiry* written in 1758, David Hume affirmed that “[...] we may define a cause to be *an object, followed by another, and where all the objects similar to the first are followed similar to the second*” (David Hume, *Enquiries Concerning the Human Understanding and Concerning the Principles of Morals*, p. 76 [2nd ed., Clarendon Press, Oxford, 1902], italics as in original).

that some signs of the cause may be visible in the *object-effect* itself, discording with David Hume. For example, if we were looking at a piece of paper, it will be easy to recognize the signs of a cutting tool. As a matter of fact, forensic medicine does nothing but searching for signs of inflicted aggressions in the human body. But David Hume himself would almost be willing to agree with us, and would only rectify us by means of the objection that what we really see are not the signs of the cause in the *object-effect*, but the repetition of aspects we have become familiar to see in those objects similar to the effect, which always followed the objects similar to the cause. We must admit that it makes no difference if we comprehend the signs impressed on the object-effect one way or the other, as long as we accept that there are *visible signs* and that we can refer to them in the *rigorous description of the event's aspect*. The rigour applied to this description should preserve the autonomy of the event in relation to any foretelling of causation. After all, the anomalous aspects of the event not always are result of the cause in quest (for example the first sign that appears during a first inspection of a corpse may be a cranial contusion, which would lead the observer to suppose a stroke to the head as being the cause of death; however, the forensic experts add chemical and medical facts obtained through toxicological analysis of the guts that reveal the presence of vegetal alkaloids; this proves, in combination with the examination of all anatomical and pathological signs, poisoning as a cause and contradicts the initial suspicion of mechanical aggression being the cause of death). In other words, the description of the event should mention all the anomalous aspects of the event. This gives support to the idea that the appearance of the event should not be mistaken for the mode of its occurrence, as there are misleading signs. But one thing is sure: if no signs were found in the object-effect that lead to think of a certain cause and also other probatory elements that could point to it were nonexistent (for example the testimony that *John*

had drunk from the poisoned water), then the conclusion that this was the cause of the victim's death would at the very least be unfounded. Moreover, it would be as unfounded as a potential conclusion that the victim died because of a scorpion's sting or any other cause.

In the present hypothesis we are used to the *ordinary causal generalisation* that the poison as well as dehydration cause death (and this is enough: there is no need to emulate the experts with their scientific explications), and we presumed that it is possible to discover, in each of the possible trajectories that led to *John's* death, if his corpse contained vegetal alkaloids or if he only showed signs of dehydration. In sum we have the necessary and sufficient information in order to resolve the case, and therefore we may simply question if the introduction of poison into the water reservoir or, alternatively, the its depletion were the cause of the death – on the *actually followed* trajectory – of that victim, which showed signs of dehydration, but did not reveal the existence of any alkaloid. So let us follow this path.

PROBLEM IV: $|(E, f, 1) \Rightarrow (\text{dead_of}(j, \text{desid}), 4)| ?$

In natural language, is it worth to ask if the |dead with signs of dehydration| of *John* that was observed at instant 4 was really caused by the fact that *Francis* had emptied the water reservoir at instant 1?

The relevant alternative trajectory is still h2. And (as we have seen) we have the following:

Moment h2 (1): $\neg \text{dead}(j) \wedge \text{disp}(j, \text{liquid}) \wedge \text{res}(\text{poison})$

Moment h2 (2): $\neg \text{dead}(j) \wedge \text{disp}(j, \text{liquid}) \wedge \text{res}(\text{poison})$

Moment h2 (3): $\neg \text{dead}(j) \wedge \text{disp}(j, \text{liquid}) \wedge \text{disp}(j, \text{poison})$

(Basic action: no relevant action; the coherent course of events will imply that:)

Moment h2 (4): $\text{dead}(j) \wedge \neg \text{dead_of}(j, \text{dehyd})$

CONCLUSION: *John* would have died anyway, but his corpse would not show signs of dehydration. Consequently we may state that |*John*'s death with signs of dehydration| is linked to the depletion of the water reservoir by *Francis*. In other words, *John* died of dehydration – it is appropriate to put it that way now – and it was *Francis* who killed him.

The conclusion is now clear and convincing.

The philosopher Mackie came exactly to the same conclusion, as we can see in the following quote:

“If the can had not been punctured, the traveller would have died of poison, perhaps even sooner than he actually died of thirst; but if it had not been poisoned, he would have died just as and when he did”²².

4 Concluding Remarks

Causation as an element of a criminal offence is different from the probative difficulties. The empirical laws that are relevant to the proof of causation, as a pure matter of fact, are not discussed here, but only causality as a category of our understanding and a general law of the intelligible world. This general law of causality is equally valid for all result crimes (e.g. homicide, bodily harm, deception offences and

²² Mackie, *op. cit.*, p. 45.

criminal damage). According to the European continental theory of conditions, any *conditio sine qua non* is by itself a cause. Causation is established by the formula of *conditio* (similar to the so-called ‘but for’ test in the common law), which corresponds to a counterfactual reasoning. However, that formula is not able to resolve adequately those cases of causal overdetermination where the result occurred by means of actions of multiple, independently intervening agents. A semantic model of the world evolution, similar to those considered in some ramified temporal logics, but more informal, may assist the comprehension of causal connections between human actions and the relevant results. At the end of the day, this model allows us to understand that, even in situations where no kind of factual uncertainty is present, doubts upon the attribution of causation to specific agents remain. We shall conclude that the attribution of causation is not a natural problem, but a logico-legal one, that has to be dealt with by way of logico-legal criteria. Nevertheless, attribution of causation must be clearly distinguished from objective imputation of proscribed harm.