Legal Knowledge and Information Systems
M. Araszkiewicz and V. Rodríguez-Doncel (Eds.)

doi:10.3233/FAIA190325

On the Formal Structure of Rules in Conflict of Laws

Réka MARKOVICH
Computer Science and Communications RU, University of Luxembourg
Department of Logic, Eötvös Loránd University

Abstract. Law has different methods and principles to resolve conflicts between norms, most of these come from Roman Law, they are well-known and much discussed. There is a whole branch of law, though, which is much less discussed while having been created exactly in order to resolve special conflicts: conflict of laws. This system within Private International Law is dedicated to providing metarules in legal situations where more than one national legal systems' rules could be applied: CoL rules indirectly settle the situation by declaring which one's should. The formal representation of how these rules work contributes not only to the modelling of this branch of law but also provides methodologies for concerns arising from other conflicting normative systems, such as ethically sensitive situations where there are multiple stakeholders with different moral backgrounds.

Keywords. Conflict of Laws, Input/Output Logic, normative systems, deontic logic

1. Introduction

According to a paradigmatic—true—story, Sándor Farkas, a young Hungarian, living in his house in the countryside of Hungary, one day decided to move to France in the hope of a better life, leaving his house behind. Living in France met his expectations: he found a girlfriend with whom they moved together and lived so for decades, he adapted himself to the French environment, so after a while he chose the French citizenship over the Hungarian one. One day, though, as all the good things, Sándor's life came to its end, leaving behind a grieving old French lady. After his death, his siblings in Hungary initiated the probate—in the hope of getting the house. The public notary sitting in her countryside office should usually answer the obvious question: How inherits the house? In this case, though, before answering that, another one arose: According to which law should she decide about the inheritance: the Hungarian or the French? The branch of law containing the answer to this latter and the similar questions is called Conflict of Laws (CoL), which is the main part of Private International Law (PIL).[1] CoL concerns international legal disputes involving persons or companies. Instead of directly settling these disputes, the task of CoL is the indirect settlement declaring which law (in terms of legal system) of the possible candidates should be applied. In the case above these were the Hungarian law and the French, but, of course, these candidates depend on the involved parties or

[1] These labels can often be seen used as synonyms, but some other questions, like e.g. the EU rules regarding private law and business law issues are usually also considered as parts of PIL, see for instance Nagy [1].

other factors playing a relevant role in the dispute (e.g. the place of entering into a contract). Each country has its own CoL rules, whenever a process is initiated regarding a legal dispute having this international nature, once the jurisdiction has been clarified, that is, the given authority (public notary, court, etc. depending on the type of the case) has the power to carry out the proceeding, the acting authority has to apply the concerning rules of their law's (lex fori) CoL and *then*—according to what these rules say—apply their own law's *or* a given foreign law's rules in order to *substantially* settle the case.

Using different formalisms to law have been a fruitful research area of applied logics and AI&Law (for overviews see, for instance [2,3,4]). While (or maybe exactly since) PIL is quite peculiar, so far it got little attention from the AI&Law community. Malerba et al. [5] discuss interpretation in this context, Dung and Sartor [6,7] provide a model in modular argumentation putting equal emphasis on the two steps in PIL: (1) the rules and process of distributing the cases between authorities, that is, clarifying jurisdiction, and (2) the rules and process of establishing the applicable law. Dung and Satror don't discuss, though, some special consequences of the specific nature of these rules (e.g. the possibility and rules of the so-called renvoi, see later). The following analysis focuses only on (2) and on this specific nature, discussing only the rules establishing the applicable law and the features which determine the adequate logic for its representation: section 2 will discuss the approach and formalism this analysis relies on, section 3 will present the preliminary formal analysis of the rules of CoL , in section 4 the discussion and further research questions will be presented introducing the relevance of understanding and modelling CoL for handling ethical questions related to AI.

2. Formal Framework: Approach, Language and Semantics

For we are talking about the specific structure of a type of legal norms, we need the explicit representation of norms enabling us to handle normative systems instead of talking about obligations alone. This tradition can be originated from Alchuorrón and Bulygin, just like what the approach's propagator, Makinson [8] calls a liberating effect of leaving the explicit (modal) operator behind when "taking the set of promulgations of a normative code to be made up of purely boolean formulae". The specific framework we are going to rely on is the intput/output (I/O) logic developed by Makinson and van der Torre [9] (and further developed by many), in agreement with Parent and van der Torre [10] that "norm always takes the form of a conditional statement." The feature (and the main objective) of I/O logic as a framework that the core mechanism of its semantics is detachment also makes it adequate for the current purposes: the analysis will discuss what mechanism the CoL rules declare to the judicature regarding applying the law. There are several other advantages of the I/O framework we won't discuss here in detail, so for which the reader is referred to [11,10], this current paper we will rely on only the very basic notions of I/O framework's semantics.

Regarding the language, we will need the following (diverging slightly from what is usually used in I/O logic): norms are ordered pairs of classical propositional logic formulae (a,x) with the intuitive meaning of a conditional norm (or rule), that is, "given a, it ought to be the case that x". In I/O logic, the "antecedent", a, representing some condition or situation (statement of facts) is called the body, while the "consequent", x, representing what the norm tells us to be obligatory, is called the head. Let N be a set of norms, that is, a set of such ordered pairs. We will need to handle sets of sets of norms,

$\mathbb{N}_{NAT} = \{N_1, N_2, ..., N_n\}$, too, representing a given national legal system containing all the codes regulating the different domains. We will talk about domains which are finite sets of statement of facts, that is, formulae: $A = \{a_1, a_2, ..., a_n\}$. Let's see an example: the rule "If a media service provider provides both linear and on-demand services, it shall notify each of its media services separately" is a norm (a,x) from the Act CLXXXV of 2010 on Media Services, N_A, regulating the domain of media A, and this act is an element of the Hungarian law $\mathbb{N}_{HUN}$.

As mentioned above, in the I/O framework the core mechanism of the semantics is detachment and it happens with the *out* operation. We use the notation $out(N,A)$ to denote the output of an input set A under the code N. As Parent and van der Torre [12] put it: "Intuitively, the output of A under N is the set of obligations that apply to a current situation." In this paper, we don't discuss the different types of this operation resulting in different logics (as we won't use them), it will be enough for those readers who are not familiar with the I/O framework if they think of its meaning in terms of the semantical consequence relation in dyadic deontic logic: $x \in out(N,a)$ *iff* $N \models O(x/a)$

3. The Specific Structure of Rules in CoL and Their Formal Reconstruction

The classical conflict resolving methods developed in Roman Law are often discussed, mostly within the question of legal defeasibility but also within legal argumentation, see e.g. [13,14,2]. The use of principles *Lex superior derogat legi inferiori, Lex posterior derogat legi priori*, and *Lex specialis derogat legi generali* can have different legal affect ranging from concerning simply applicability (spec-gen) to rendering the lower one invalid (sup-inf), but they share two important features: (i) aiming at resolving possible conflicts *within a given legal system* and (ii) providing priority standards based on *some features of the sets of norms which is pre-given* and that we can rely on in the case of need. Both the situation in, and the rules of, Conflict of Laws are quite different.

PIL concerns relations across different legal jurisdictions between natural persons, companies, corporations and other legal entities. In these international legal disputes the conflict of laws—as its name shows—arises *between legal systems*, that is, between sets of sets of norms, so we step up a level. The conflict itself is given by the situation that more than one national laws (legal systems) could be applied, and resolving it means deciding which one should. The crucial point is the mutual acknowledgment by each country of all legal systems being equal, that is, there is *no previously given ordering* on the set of all legal systems which we could rely on. Another solution is needed.

The currently widespread spirit of the applied methodology comes from the 19th century legal scholar, Carl von Savigny, whose idea was to find the local seat of a given legal case, that is choosing the applicable law according to which legal system the case has the strongest relationship to [15]. That is, the CoL rules do not settle directly a case by declaring what to do, their task is the indirect settlement through assigning rules: rules providing which law should be applied to the direct settlement. The difference is visible in the structure of these norms and the "normal" substantial legal norms. The substantial legal rules have the following structure: a) the hypothesis sets forth the conditions under which a person should be guided by the given norm and b) the operative part is the disposition indicating the obligation (or permission). While the CoL rules are assigning rules with the structure: a) the hypothesis designates a domain (of cases) b) the operative part is a command to apply the appointed legal system.

What does it mean regarding the formal structure of these norms? While the substantial norms are ordered pairs of formulae (a,x), the CoL rules will be *ordered pairs of sets*: the body is a domain A, that is, a set of statement of facts: $A = a_1, a_2, ..., a_n$; while the head is also a set, a set of sets of norms, that is, a (national) legal system $\mathbb{N}_{nat_1}$. That is, the form of norm in CoL is: $(A, \mathbb{N}_{nat_1})$. These special norms create the statute on CoL, that is the set N_{CoL}: $N_{CoL} = \{(A, \mathbb{N}_{nat_1}), (B, \mathbb{N}_{nat_2}), ...(Z, \mathbb{N}_{nat_n})\}$

And this set of these special norms, that is, the statute on CoL is part of the Hungarian legal system, next to the Act on Media, the Criminal Code, the Act on Tax, etc.:
$N_{CoL} \in \mathbb{N}_{HUN}$ $\mathbb{N}_{HUN} = \{N_A, N_B, ..., N_{CoL}\}$
And this is true not only to the Hungarian law, but to each national legal system, so we are better to indicate that in the Hungarian law you can only find the Hungarian act on media: the French, the Italian, the Chinese and so on have their own—just like they have their own statute on CoL:
$\mathbb{N}_{HUN} = \{N_A^{HUN}, N_B^{HUN}, ..., N_{CoL}^{HUN}\}$ $\mathbb{N}_{FRA} = \{N_A^{FRA}, N_B^{FRA}, ..., N_{CoL}^{FRA}\}$
We still need to show the mechanism of the rules in CoL: How does the appointment of the applicable legal system happen? It happens in the spirit of Savigny's thought: the legislator chooses the legal system which might be the closest to the case providing the most fitting solution to the legal case. What did it mean for the Sándor Farkas case? The Hungarian public notary found in the Hungarian CoL rules the following section: *"The legal relationship of inheritance shall be adjudged on the basis of the law which was the personal law of the testator at the time of his death."*This section (and the sections in general in the statute on CoL) unequivocally assign the legal system that is to be applied to a given group of statements of facts (that is, a domain). In case of Sándor this was the French law, as he had taken (got) the French citizenship while living in France and had it during his life afterwards, therefore that was the personal law of him at the time of his death. The methodology providing the priority standard visible in this rule is based on an ordering too. This ordering is on the set of the *factors* of a type of legal cases (that is, coming from a given domain).

Each statement of facts is a conjunction of sentences: $a \leftrightarrow \varphi \wedge \psi \wedge \chi \wedge ...$ What makes the situations covered by CoL special is that the factors come from different jurisdictions. In the case of Sándor, his original nationality was Hungarian, his citizenship at the time of his death was French, the house was in Hungary, etc. and forming these like sentences in the conjunction will "bear" these different nationalities: $a \leftrightarrow \varphi_{nat1} \wedge \psi_{nat2} \wedge \chi_{nat3} \wedge ...$ In CoL, the legislator creates a partial order with a maximal element on the (finite) set of the conjuncts: $S_a = \{\varphi, \psi, \chi ...\}$ and assigns the relevant national legal system: $(A, \mathbb{N}_{nat\varphi})$

So far so good. The Hungarian public notary learned from the Hungarian CoL rules that she needs to apply the French law. As we have seen above, though, the set called the French law has many elements: statutes, that is sets of norms, and one is among them is the French statute on CoL. As entering the French law, the legal dispute over Sándor Farkas' inheritance is still an international one, therefore, first the CoL rules need to be checked to learn which law should be applied. The French CoL rules said that the legal relationship of inheritance has to be adjudged on the basis of the law which was the personal law of the testator at the time of his death (so far the same as the Hungarian law), although, if there is a real estate in the inheritance, then it should be adjudged on the basis of the law of its location. Which is the Hungarian law! As the reader likely suspects by now, this could lead to an infinite regress. To prevent that, the Hungarian rules on CoL (which back then were codified in a so-called Law-Decree) specified that

once the applicable law is given, the substantial rules of the given legal system should be applied (that is, not its CoL): *"If, in accordance with this Law-Decree, foreign law is applicable, the rules of the applicable foreign law directly settling the issue in question shall govern."* Formally this norm is: $(A, \mathbb{N}_{nat\varphi} \setminus N_{CoL}^{nat\varphi})$
Although, it is always easier to any authority to apply its own law, so we can find a supplement: *"If, however, the foreign law refers back to the Hungarian law in the issue concerned, with regard to this rule, the Hungarian law shall be applicable."* This solution leads to the called renvoi and formally looks like:
If $((A, \mathbb{N}_{HUN}) \in out(N_{CoL}^{nat\varphi}, a))$ then $(A, \mathbb{N}_{HUN} \setminus N_{CoL}^{HUN})$
We need to define what the output is in the case of CoL rules, for which we need to define the output of a national law, that is, set of sets of norms:
$x \in out(\mathbb{N}_{nat1}, a)$ iff $a \in A \wedge N_A^{nat1} \in \mathbb{N}_{nat1} \wedge x \in out(N_A^{nat1}, A)$
$x \in out(N_{CoL}^{nat2}, a)$ iff $a \in A \wedge \mathbb{N}_{nat1} \in out(N_{CoL}^{nat2}, A) \wedge x \in out(\mathbb{N}_{nat1}, a)$

4. Relevance in the Ethics of AI and Further Research

The rules of CoL are quite special, their formal representation requires some modification of what we have used so far to represent norms and normative systems, but the formalism of the input/output framework can be easily adapted to it. The main specificity of these rules is assigning a set of sets of norms to a set of statements, i.e., the applicable legal system to a given domain. What makes the whole methodology of CoL special, compared to other (norm-)conflict resolving methods, is that there is no previously given ordering on the set of the legal systems that we could rely on (as the nations acknowledge each-other's legal systems as equal) and, therefore, the legislator needs to provide a context-dependent solution by appointing the maximal element of the set of the factors, and, by virtue of that, appointing the relevant legal system to apply.

The contribution of this paper is providing an approach and explanatory formal analysis of the specific nature of rules in CoL. There are several tasks and questions to be answered to make it complete: what logical properties do we need? For instance, halting infinite regress might mean that the *out* operation cannot be transitive. Indeed, the renvoi (when the applicable law's CoL "sends back" the case to the forum's law) is not the only case to be handled: it might happen that the applicable law's CoL rules command to apply a third law and so on (called transmission)—in principle it also might mean the possibility of an infinite regress which has to be stopped and the different countries have different solutions to that (not allowing transmission at all, allowing only limited (small) number of steps, etc.). Also, there are various approaches applied in the different national rules on CoL whose interaction provides a fertile ground for formal research; just like the question of characterization of the cases in different legal systems, that is, how the extension of the domains as sets influence the output.

Conflict of Laws, or PIL in general might seem too peculiar—as Dung and Sartor put: exotic—to be dealt with, but it's importance will only continue to raise up until we have different legal systems and substantial differences in their rules. The development of CoL in the previous centuries was motivated by the increasing volume of international traffic of goods and people, a trend that won't go away anytime soon. A proper formalization might help see clearly and solve problems like the so-called forum shopping when the output, that is, the result of the case depends on which jurisdiction one files for action in (what would have happened if grieving girlfriend had initiated the probate in France?).

But a comprehensive formalization will also be interesting for other areas, too: namely, the ethics of AI, one of the most salient topics today. The results of the robust survey of MIT, the Moral Machine [16] has shown: there are no globally accepted, generally valid values or set of rules to rely on when we talk about the ethics of our (soon-to-be-developed) AI tools. However, it is a major concern requiring some solution soon. We might say that an AI tool doesn't have to enhance everyone's ethical considerations, only that of those who are affected by it. But the issues and debates regarding autonomous vehicles bring clear emphasis on that there are multiple stakeholders. Realizing this, Liao et al. [17] developed an architecture, called Jiminy, which is supposed to advise AI tools in ethically sensitive situations, when there are multiple stakeholders with different normative systems expecting to comply with different moral rules. Handling different peer normative systems is exactly what CoL does, therefore, its techniques seeking for context dependent resolution can definitely provide insights this very 21st century problem.

Acknowledgement

The author has received funding from the EU Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agr. No. 690974 (MIREL).

References

[1] C.I. Nagy, *Private International Law. Hungary*, Wolters Kluwer, 2012.
[2] D. Grossi and A. Rotolo, Logic in the law: A concise overview, in: *Logic and Philosophy Today*, 2011.
[3] G. Sartor, *Legal Reasoning. A Treatise of Legal Philosophy and General Jurisprudence*, Springer, 2005.
[4] H. Prakken and T. Bench-Capon, Introducing the logic and law corner, *Journal of Logic and Computation* **18** (2008), 1–12.
[5] A. Malerba, A. Rotolo and G. Governatori, Interpretation Across Legal Systems, in: *Proceedings of JURIX 2016*, pp. 83–92.
[6] P.M. Dung and G. Sartor, A Logical Model of Private International Law, in: *Proceedings of DEON 2010*, Springer, Berlin, 2010, pp. 229–246.
[7] P.M. Dung and G. Sartor, A modular logic of private international law, *Artificial Intelligence and Law* **19**(2–3) (2011), 233–261.
[8] D. Makinson, On a fundamental problem of deontic logic, in: *Norms, Logics and Information Systems. New Studies in Deontic Logic and Computer Science*, IOS press, 1999, pp. 29–53.
[9] D. Makinson and L. van der Torre, Input/Output Logics, *Journal of Philosophical Logic* **29**(4) (2000), 383–408.
[10] X. Parent and L. van der Torre, Input/output Logic, in: *Handbook of Deontic Logic and Normative Systems*, D. Gabbay, J. Horty, X. Parent, R. van der Meyden and L. van der Torre, eds, College Publications, 2013, pp. 353–406.
[11] D. Makinson and L. van der Torre, What is Input/Output Logic?, in: *Foundations of the Formal Sciences II. Trends in Logic*, Vol. 17, B. Löwe, W. Malzkom and T. Räsch, eds, Springer, 2003.
[12] X. Parent and L. van der Torre, *Introduction to Deontic Logic and Normative Systems*, College Publications, 2018.
[13] H. Prakken and G. Sartor, On the Relation Between Legal Language and Legal Argument: Assumptions, Applicability and Dynamic Priorities, *Proceedings of ICAIL '95* (1995).
[14] G. Governatori, F. Olivieri, S. Scannapieco and M. Cristani, Superiority Based Revision of Defeasible Theories, in: *Semantic Web Rules*, Springer Berlin Heidelberg, Berlin, Heidelberg, 2010, pp. 104–118.
[15] F.C. von Savigny, *Private International Law. A Treatise on the Conflict of Laws: And the Limits of Their Operation in Respect of Place and Time*, T. and T. Clark, 1869.
[16] E. Awad, S. Dsouza, R. Kim, J. Schulz, J. Henrich, A. Shariff, F. Bonnefon and I. Rahwan, The Moral Machine experiment, *Nature* **536** (2018), 59.
[17] B. Liao, M. Slavkovik and L. van der Torre, Building Jiminy Cricket: An Architecture for Moral Agreements Among Stakeholders, ACM, 2019.