

PRINCIPLES FOR THE FORMAL REPRESENTATION OF LEGISLATIVE STATEMENTS

Giacomo Ferrari (*) Carlo Biagioli (**)

(*) Università di Pisa Dipartimento di Linguistica Corso Italia, 40 56100 PISA (Italy)

(**) Istituto per la Documentazione Giuridica Consiglio Nazionale delle Ricerche

Via Panciatichi, 56/16 50127 FIRENZE (Italy)

1. INTRODUCTION

"The growing participation in social life, typical of modern society, combined with the decrease in set modes of behaviour, produce an increase in the demands on the legislative output required from the political system. This leads to a notable increase in legislation and in its complexity"(1). Two distinct problems arise from this:

- a) imprecision of the legal regulations in force
- b) ambiguity of regulatory terms.

1.1. Vagueness of the Regulations

It is, in fact impossible to establish a priori which aspects of a legal regulation are in force at a given moment.

This is only possible through the application of different kinds of rules and criteria and through interpretation. For example, one can only establish whether one is in a situation of tacit repeal of a rule by identifying another rule which has come later or is more important, but which is, however, in contrast with the former.

It is not just by chance that present legislative electronic files inevitably include all the regulations which have been promulgated, whether in force or not, without identifying the legal regulation which is in force (2).

1.2. Ambiguity of the Regulations

The imprecision in the regulations arises principally from their relationship to each other and in the language used.

As far as the first point goes, it is common knowledge, in fact, that one of the biggest problems in the consultation of a regulative corpus lies in the cross references from one regulation to another.

Regarding the latter, it is normal procedure to divide the ambiguity, sometimes found in the terminology of the regulations, into syntactic and semantic ambiguity.

The semantics are principally concerned with establishing the meanings associated with each individual word in the formulation. Here we can go further and distinguish between the ambiguity of the intension of the meaning and the ambiguity of the extension of the reference. These semantic aspects are clearly distinct from the syntactic aspects. The latter are concerned with the role of the words which describe relationships between 'semantic terms', that is the 'syntactic terms'. At times, the semantic ambiguity is welcomed by the legislator, as it can still be applied to cover unexpected situations. The syntactic ambiguity, on the other hand, does not seem so welcome, as it is caused by the lack of logical rigour of certain syntactic terms (3).

1.3. Computer Science Applications Undertaken at the IDG

Much has been done to improve legislation, both in the juridical field (4) and in computer science.

In the recent past, computer science has been applied to legislation, thus establishing electronic files of regulations. Today, a new branch of computer science, artificial intelligence, offers new prospects in this direction.

Since the mid-sixties, work has been going on studying techniques and formalisms which deal with the meaning of natural language. They have been trying to model that kind of representational tools and deductive activity which a person uses in order to carry out linguistic exercises such as translating, abstracting or answering questions.

One example of a system which works by using information selected by human experts, and organised deterministically, not based on formal reasoning, is the "Automa infortunistico" ('Automated Car Accidents Consultant'). This was an experiment in automated consultation of the extent and amount of damage resulting from road accidents, carried out at the Istituto per la Documentazione Giuridica, between 1974 and 1976 (5).

Also, since 1983, at the Institute, the "Analysis of Legal Language" Research Group has been working on legal language, creating evaluation systems in terms of readability and orthographical correctness. The group has also been dealing with the problem of classification and automatic abstracting (of legal texts) and the comprehension and processing of meaning (6).

The "Automated Analysis of Legislation" Research Group has been working since 1981 on the study of the analysis and representation of juridical regulations. During the initial phase, they used tools such as propositional logic, deontic logic and truth tables. Recently they have adopted the logic of the predicates as the representative formalism of regulative statements and the Prolog language as software to implement the 'model' into the computer (7).

2. ANALYSIS OF REGULATIVE STATEMENTS

When referring to the way information science deals with natural language, the processes of comprehension and interpretation are normally subdivided into morphological/lexical, syntactic, semantic and pragmatic modules. These are the links in the chain which lead from natural language to its understanding by the computer.

In this study we have concentrated on two aspects - the semantic analysis and the pragmatic analysis of the way legislative language is dealt with.

On the semantic level, it is generally considered that words, wherever possible, should be lead back from their original multiplicity of meanings to well-defined concepts, making use both of the theoretical advances of juridical doctrines and of computational linguistics tools. The concepts have to be clearly defined as well as their organisation in wider conceptual structures, when possible and necessary.

On the pragmatic level, we think that a useful method of linguistic analysis is the classification of the speech acts conveyed by natural language. As Winograd points out "every speech act has 'conditions of felicity', whereby it is appropriate, and 'conditions of satisfaction' whereby it is complete" (8). An effective, detailed classification of speech acts is useful because the acts of the various categories are not used by chance.

In fact, even though we can assign a semantic interpretation to every regulative formulation, the context and means of communication are also influential. For example, deontic logic as semantics is only valid for prescriptive (regulatory) statements.

It therefore becomes necessary to provide an analysis in terms of illocutionary acts in order to decide on the most appropriate semantics. In a legal context, besides the illocutionary act, it is worthwhile studying the models which are derived from the distinction between the transmitter-receiver. Another possible view is a distinction based on the field of action, i.e., the subject in question (in a general sense). Formulations concerning the concrete life of the individual (existential, direct) and formulations which define and regulate legal procedures (procedural, indirect) are differentiated.

Austin's (9) heir, Searle (10), proposes that a linguistic utterance is an 'act' with just as much value as any physical act. More specifically, Searle identifies four types of constitutive acts in the speech act:

- illocutionary act i.e., the speech act including the notion of the act which is being carried out (e.g. affirming, asking, etc.)
- propositional act i.e., the proposition which constitutes the context of the illocutive act
- referring act i.e., the identification of objects and entities
- predicative act i.e., the predication of something on something else.

A propositional act is created by the combination of a referring act and a predicative act.

Even though Searle applies this analysis to spoken utterance, it seems possible to transfer the same concepts to texts, particularly if they are well characterized on the side of illocutory force. Therefore, we assume that text analysis also means the identification of the performed acts. More specifically:

- identification of speech acts in the text. In order to do this, it is assumed that a speech act contains only one illocutionary act;
- identification of the illocutionary act, i.e., deciding on the illocutionary force of the speech act under consideration;
- identification of the propositional act or acts which constitute the speech act in question;
- identification of the predicative and referring acts in the propositional acts. A propositional act contains only one reference act and only one predicative act and both must be present in order to produce a propositional act.

As we have already suggested, it seems appropriate to add, some details about the transmitter and the receiver of the illocutive act itself, as well as some details about the sphere of action, to this method of analysis of legal texts.

2.1. Pragmatic Analysis

The following procedure is suggested for the classification of the acts which have been identified in the analysis of a given text in the field of pragmatics:

1. identification of illocutionary acts;
2. specification of the transmitter - receiver pair;
3. classification of the general aim of the illocutionary act according to whether it regulates "acts of everyday life" or "legal acts".

1. Illocutionary act:

In the legislative field, at least two important classes of illocutionary acts can be identified:

- a) constitutive rules;
- b) normative (regulative) rules.

Constitutive rules are the basis of (and make possible) the "legal game": they can be compared to those chess rules which establish the permitted moves of the various pieces. They define types of behaviour and legal status which are then used in the regulatory rules.

For example:

"Coming of age takes place on one's 18th birthday";

"The decree acquires validity in law when the established length of time has lapsed as stated in the fourth sub-section, if no protest has been lodged".

Normative rules discipline existential or legal actions.

For example:

"Minors are not allowed to marry";

"Protests can be lodged against the decree within the peremptory period of 10 days from its announcement".

2. Transmitter-receiver

Remaining in the field of pragmatics, speech acts can be classified according to the difference between the pairs, transmitter-receiver. It seems possible to identify 2 different transmitter/receiver combinations in the rules which we are using as examples, taken from the selection of the Italian Civil Code, Book 1, Chapter VI, Article 3, Section 1.)

- a) legislator - individual.
- b) legislator - legal authority.

The following examples belong to group a):

"Protests can be lodged against the decree with recourse to the Court of Appeal...";

"A woman can only enter into marriage 300 days after the dissolution, annulment ..."

Examples belonging to group b):

"Permission can also be granted... when the relationship (in law) resulted from a marriage declared null and void";

"The Public Prosecutor and the parties concerned are notified of the decree."

3. Sphere of Action:

Finally legislative speech acts can be identified according to their purpose, in a very general sense, according to their sphere of action:

- a)- acts which deal with actions, situations in everyday life (existential, direct);
- b)- acts which deal with legal actions, situations (procedural, indirect).

The following is an example from the first group:

"It is forbidden for the person concerned to enter into marriage as he is mentally incapable".

From the second group:

"The Court of Appeal makes its decision by issuing an impugnable ordinance in camera".

2.2. Semantic Analysis

Within the illocutionary act, the propositional act can be analysed from a semantic point of view by classifying the predicative and referring acts - i.e., the logical-syntactic structure of the propositional act, which, in turn, makes up the content of the illocutionary act.

They can be constructed directly from the sentences of the text, using the information associated with the lexicon.

Traditionally, verbs or other expressions which designate actions make up the framework of a predicate. In the specific case of legislation it is natural to expect that a given well defined group of such expressions displays the specific semantics of the legal environment.

This also holds true for the referring acts which identify concrete or abstract objects. In fact, it may even be possible to establish a classification system of objects and entities according to the "world" to which they belong: real or legal.

Terms such as "ordinance", "sentence", "decree", stand for entities which belong exclusively to the legal world, outside of which their designation function ends or becomes irrelevant. Vice versa, expressions such as "marriage", "father", "crime" designate existential objects or entities, even though they are defined by constitutive legal rules. They refer, in fact, to those areas which overlap with the legal world i.e. those with which the law deals, defining and regulating.

In any case, predicative and referring acts should be in harmony in a comprehensive structure which represents relationships between terms. Semantic analysis of speech acts consists, therefore, in the identification of reference and predicative acts and in their structural organisation.

For example:

"Minors are not allowed to marry".

Depending on the illocutionary act which is chosen, the propositional act will be:

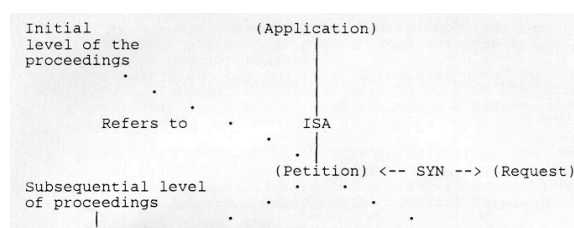
- Minors / cannot / marry
- Minors / to marry

(In the second hypothesis the propositional negation is absorbed by the illocutionary act (e.g., to forbid)). However, reference and predicate can be identified:

- reference = "Minors"
- predicate = "to marry"

According to what has been said above, the entity "minors" for example, will probably be defined by the legislator in a constitutive act and therefore it will probably be represented in a structure such as that described below.

Regarding this structure, it is possible to think of aggregation of concepts, a model based on the classic relationship of synonymy, ISA, Part-of, but also of other kinds (connected to the specific aspects of the legal system), exploiting the representational capacity of tools such as semantic networks and frames (11).



Returning to the rules which have been singled out for study, we can try to represent some terms, relating to the records of a trial of an individual, which appear in them. This can be done by means of a semantic network in the following way:

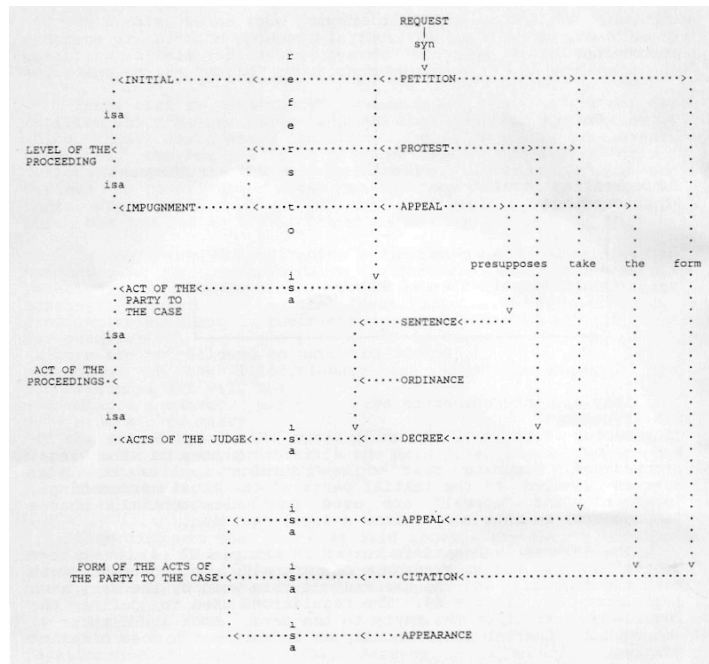
They are interconnected by:

SYN: synonymy

ISA: member (term 1) of the whole (term 2).

Refers to: this deals with the different phases of the legal proceedings, assuming that while "petition" applies to legal actions limited to the initial party of the legal proceedings, "protest" and "appeal" are used in Subsequential phases (impugment) in that they follow a legal decision.

The diagram is unsatisfactory: in Article 87 (4), the term "petition" is used as a synonym of "appeal", in contrast with both the diagram, and the use made of this word by the very saure legislator in article 84. The regulations used to define the records of a trial of the party to the case, Book 1, Chapter vi and Book 2, Chapter iii) can help us to work out a more detailed diagram:



Compared to the previous diagram, the following links have been introduced;

TAKES THE FORM: from the above-mentioned regulations, the concept of the form (in a legal sense) of the acts of the party to the case emerges. The association act-corresponding form is not always defined and neither does it seem that the roles of the terms are rigorously assigned.

ASSUMES: specifies the two terms associated with "impugment"; "protest" and "appeal" are differentiated both by the form and by their objective: the first is used to impugn a decree, the second a sentence.

These diagrams are only valid as examples. In order to produce a faithful representation, a more detailed study is required of the legislation on the subject in question and one would also have to see what the legal doctrine says about it.

2.3. Conclusion

We base our belief on the feasibility of such an analysis and representation on the assumption that computers deal with meaning in an acceptable manner when (and only when), they operate in a defined area of possible meanings.

In our opinion this is the case with the language used for legal rules. We consider it to be circumscribed and "technical" enough to enable it to be dealt with successfully.

To make this possible, we suggest that the following steps are necessary:

a) preliminary analysis of the legal language, referring to the numerous studies on language and in particular, on normative language, which have been developed by the philosophy of language and legal philosophy (12).

In particular:

- analysis of the different kinds of legislative texts;
- analysis of different types of model of speech; (illocutionary acts);
- analysis of terms;

b) choice of the most suitable methods language;

- identifying the most suitable tools to specify the various types of regulatory corpuses;
- identifying the most suitable illocutionary types;
- identifying relationships between the terms based on the legislation itself (constitutive rules) and on the legal doctrine.

c) adoption and integration of different formalisms:

- logical languages (Prolog, for example) can be used to represent propositional acts and their relationships;
- semantic networks and frames can be used to deal with the terms and their relationship.

To sum up, different formalisms have to be decided upon, which will be able to represent the rules in an intelligible way for the computer. They will also have to be expressive enough to deal with most of the meanings contained in the rules not limited to one point of view. The ultimate goal is not only that of enabling the calculation of the consequences of the rules to be carried out, but also that of analysing the definitions of given concepts or legal institutions which the legislator provides here and there in the regulations, in order to establish, for example, whether the contradict or clash with one another.

Notes

- (1) Martino A.A., Automated Analysis of Legislation, in: Proceedings of the Law and Technology Conference (Houston Texas, August 1984), p. 2.
- (2) For this specific subject see: Pagano R., Note per un sistema di informatica giuridica, in: Informatica e diritto, VI, 1980, 2/3, pp. 197-209, 301-303. For more general works on legal information systems see: Lombardi Vallauri L., Democrazia dell'informazione giuridica e informatica, in: Informatica e diritto, I, 1975, 1, pp. 1-25; Martino A.A., Maretti E., Ciampi C.,

Modelli operativi di sistemi giuridici positivi. Guida alla lettura di "Logica, informatica, diritto", in: *Informatica diritto*, IV, 1978, 2, pp. 1-53; Ciampi C., *Intelligenza artificiale e sistemi informativi giuridici*, in: *Informativi e diritto*, VIII, 1982, 2, pp. 79-91.

- (3) On the subject of the ambiguity of rules see: Allen L.E. *Una guida per redattori giuridici di testi normalizzati*, in *Informatica e diritto*, V, 1979, 1, pp. 61-114.
- (4) Commissione di Studio per la semplificazione delle procedure e la fattibilità e l'applicabilità delle leggi, nonché l'approntamento dei conseguenti schemi normativi", Report presented to the Presidency of the Chamber of Deputies,] June, 1981, paragraph VII, b.
- (5) Biagioli C., Fusaro A., Innocenti A., Marellò G., *Autol giuridico: un sistema sperimentale di liquidazione del danno da sinistro stradale*, in: *Proceedings of the Conference organized by the Istituto per la documentazione giuridica (del Consiglio Nazionale delle Ricerche on "Giornata d'informatica giuridica"* (Florence, Italy, 3 December 1976 Fameli E., *L'automa infortunistico: un esperimento consulenza giuridica automatica*, in: *Informatica e diritto*, II, 1976, 1, pp. 1-50; Lombardi Vallauri L., *Esortazio all'informatica giuridica metadocumentaria*, in: *Proceedin of the 2nd International Conference organized by the Court of Cassation on "L'informatica giuridica al servizio d paese"*, Sess. V, n. 10, pp. 18.
- (6) Biagioli C., Mercatali P., Tiscornia D., *Banche di dati divulgazione del diritto: modelli per analisi quantitativa del linguaggio giuridico*, in: *Informatica e diritto*, 1984, 2, pp. 257-305; Biagioli C., Mercatali P., *Modello statistico per analisi linguistico-quantitative automatici Applicazione all'archivio Dottr. per il controllo de: capacità informativa degli abstracts*, in: *Proceedings of i III Conference organized by the Court of Cassation "L'informatica giuridica e le comunità nazionali internazionali"*, (Rome, 9-14 May 1983), Rome, EGA, 19 Abba L. Biagioli C., Mercatali P., *Sistema semi-intellige per il controllo formale di testi giuridici*, Paper presen at the II International Conference organized by the Istituto per la documentazione giuridica of the Consiglio Nazionale delle Ricerche on "Logica, Informatica, Diritto" (Florence, 3-6 September 1985).
- (7) Biagioli C., et al., *A Linguistic Tool for Legal Data Retrieval*, in: Martino A.A. (ed.), *Deontic Logic, Computational Linguistics and Legal Information Systems*, North-Holland Publishing Co., Vol. II, 1982, pp. 327-337; Biagioli C., et al., *Experiments on the "Model" of SanchezMazas*, in: Martino A.A. (ed.), *Deontic Logic, Computational Linguistic and Legal Information Systems*, North-Holland Publishing Co., Vol. II, 1982, pp. 215-226. Biagioli C. et al., *Un modello aritmetico per l'analisi dei sistemi normativi: una proposta sperimentale*, in: *Proceedings of the III Conference organized by the Court of Cassation on "L'informatica giuridica e le comunità nazionali e internazionali"*, (Rome, 9-14 May 1983) Roma, EGA, 1983; Biagioli C., et al., *Automated Analysis of Legislation*, in: Peczenik A., et al. (eds.), pp. 587-605, 1984 (paper presented at the Conference on "Legai Theory and Philosophy of Science" (Lund, Sweden, 11-14 December, 1983); Biagioli C., *Riflessioni e proposte per la ricerca AAL, IDG/CNR*, Firenze, July 1984 (internal report); Martino A.A., et al., *Analisi automatica della legislazione, Developments in Research from 1981 to 1984*, IDG/CNR, Firenze, 1985; Abba L., Asirelli P., Cammelli A., Mariani P., Martelli M., Martino A.A., Natali F. Tiscornia D., *Base della conoscenza nella analisi automatica della legislazione*, paper presented at the II International Conference organized by the Istituto per la documentazione giuridica del Consiglio Nazionale delle Ricerche on "Logica, Informatica, diritto" (Firenze, 36 Sept. 1985).
- (8) Winograd T., *Software per lavorare con il linguaggio*, in: *Le Scienze*, Vol. 33, Nov. 1984, No. 195.
- (9) Austin J.L., *How to Do Things with Words*, Oxford, 1962.

- (10) Searle J.R., *Speech Acts*, Cambridge University Press, 1969.
- (11) For systems of automated analysis of meaning see Ferrari G., *Analisi automatica del significato*, in: *Linguistica Computazionale*, CLESP, Padova, 1983, Chap. I, pp. 5-57.
- (12) On this subject see the anthology of the work of some of the most important authors edited by R. Guastini, *Problemi di teoria del diritto*, Il Mulino, Bologna, 1980.