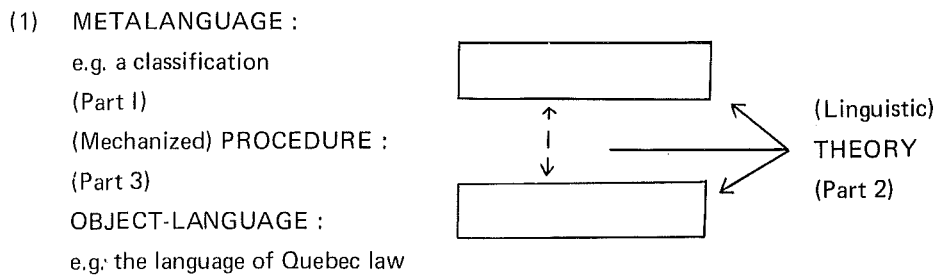


LINGUISTICS AND MECHANIZED INDEXING OF LEGAL TEXTS*

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INTRODUCTION AND ABSTRACT

As Gardin 1969 points out, an ideal semantic analysis procedure would be *reversible* : analysis would be testable by synthesis, and vice versa. The three main components of semantic analysis and the corresponding three main subdivisions of this paper are given in (1) (for further details, see Gardin 1969 and Stone *et. al.* 1965) :



Within this framework, I wish to identify and describe four general types of statement, which I believe to be essential for mechanized indexing, particularly in the field of law. The broad topics with which these statements are concerned, together with the place at which they are presented in this paper, are given in (2) :

- (2) (A) Conceptual discourse structures (1. METALAGUANGE)
- (B) Implicit relations between sentences (2.1 THEORY)
- (C) Semantic sentence types (2.2 THEORY)
- (D) Grammatical sentence types (2.3 THEORY)

The theoretical part of my paper (Part 2) draws heavily on some recent work by American linguists. The last part of the paper (Part 3) presents briefly two computerized semantic analysis *procedures* in terms of the way they *integrate* some of my four types of statements (Noël 1968, Bély *et al.* 1970).

1. METALANGUAGE

The notion of metalanguage lends itself to *factual* and to *structural* considerations. The basic *fact* here is that there exist *several* metalanguages for each given object-language. This has led classification experts to set up so-called "convertibility" systems, relating one classification to another *in the same or in relatable fields*. Corresponding to this diversification of metalanguages, there is a basic fact about object-languages which, until recently, had never been discussed by linguists. As Robin Lakoff (1970) puts it, any sentence or utterance is "ambiguous", and this ambiguity is determined by *differences in the receiver's or addressee's knowledge*; for instance, a zoologist's *versus* a little boy's knowledge about alligators in sentence (3) (Langendoen 1970, 129) :

(3) That isn't an alligator ("ambiguous").

From the *structural* point of view, documentary metalanguages such as classification systems consist basically of two kinds of symbols : a dictionary of *concepts*, and a syntax of, say, *connectives*. The syntactic symbols can be provided by a linguistic theory or by a documentation model. This is not so, however, with the dictionary of concepts. As far as I can see, no theory of language provides or could provide concepts such as those symbolized by classification entries. The implicit or explicit claim made by most linguists that a semantic component of linguistic theory can be conceived of as some kind of universal metalanguage has never been substantiated and is contradicted by *facts* such as those just discussed in connection with the diversity of metalanguages. One must therefore admit that *only* the expert, on the basis of a *non-linguistic* theory, is able to define concepts that will serve to distinguish the texts in his field from one another. Because such concepts are defined *prior to* the semantic analysis and on a theoretical basis, the setting up of a documentary metalanguage is an activity which is akin to that of setting up a scientific theory.

An attractive example of a metalanguage for legal documentation is provided by Lawlor's system of "fact descriptions" for Supreme Court judgements on "involuntary confession cases" in American law (Reed C. Lawlor, unpublished). Lawlor has set up a list of 68 "fact descriptions". One of these (Lawlor's number 17) is quoted in (4) (a) together with an object-language passage which presumably corresponds to it (the underlined portion of (4) (b), a passage from the summary of the case *Gallegos v. Colorado*) :

- (4) (a) Petitioner had no consultation with friends prior to the confession (metalanguage concept).
(b) The crucial evidence introduced at the trial was *a formal confession* which petitioner had signed before his victim died, before petitioner had been brought before a judge, and *after he had been held for five days without seeing a lawyer, parent, or other friendly adult ...* (object-language).

One of the interests of Lawlor's study lies in the *format* he proposes for representing Supreme Court judge-

ments. A greatly simplified illustration of this format is presented in (5); *x, y, z* stand for concepts ("fact descriptions") of the type illustrated above in (4) (a), and + Opinion and - Opinion refer respectively to the opinion of the Court and to that of the dissenting judges :

(5) Opinions : "Fact status"	+ Opinion	- Opinion
Asserted Present	<i>x, y</i>	<i>z</i>
Asserted Absent	<i>z</i>	
Referred to as partial basis for decision	<i>x, y</i>	<i>z</i>

Writing, say, *t, u, v, w*, for such symbols as "+ Opinion", "Asserted present", etc. (5) can be rewritten as in (6), which can serve to illustrate the first type of statement I propose, namely statements concerning *conceptual discourse structures* :

(6) Text = *t, u, v, w, x, y, z* (A. *Conceptual discourses structures*).

Note that, like Lawlor's table, (6) provides no *explicit* representation of *syntactic* relations. Furthermore, (6) is linguistically very complex : it results from *many* complex statements of the type illustrated in (4). Lastly, (6) manifests a "*double competence*" (Gardin's preface to Bely *et al.* 1970, xiv) : the lawyer's competence as an *expert*, and his competence as a *user of*, say, the English language. A mechanized indexing procedure can be defined as a system of rules representing this double competence.

2. THEORY

2.1 *Implicit relations between sentences.*

I wish to open my theoretical discussion with some of the most controversial topics of recent linguistic research, namely various types of *implicit relations between sentences or sentence representations*. For lack of time, I will not present a rigorous account of the underlying linguistic research and will merely give illustrations drawn from legal language around the following main points :

- (a) Bach's analysis of *nouns* in terms of structures of the type "Indefinite Pronoun + Relative Clause with a verb or a verb-like noun". One of the features of this analysis is that it provides for the statement of *tenses* implicitly associated with nouns (Bach 1968) (see 7).
- (b) Lyons' and Leech's discussions of inductive and deductive *implication* as what is *implicitly* asserted or denied in a sentence by virtue of some properties of lexical items. (Lyons 1963 and 1968, Leech 1969) : for instance, a relation holding between "This is an animal" and "this is an alligator" (see 8).
- (c) Fillmore's *presupposition*, which he defines as the set of "preconditions" determining whether or not a sentence is felicitous. For instance, "A borrowed B from C at time T" presupposes that "C had B before T" (Fillmore 1968b, 52). This broad notion could serve to characterize Austin (1962)'s *performative* utterances, that is, utterances used for performing various acts. Fillmore's notion of presupposition also concerns some interesting subcategories of verbs : those which Karttunen 1970 has called "implicative" verbs (for instance, "John *managed* to kiss Mary" implying that "John kissed Mary" : see 9), and the verbs which are called "factive" after the Kiparskys (1968).
- (d) George and Robin Lakoff's broader definition of *presupposition* as whatever implicit knowledge can be inferred from a sentence or utterance, and Robin Lakoff's definition of a partial identity condition holding between *conjoined* sentences in terms of this notion. R. Lakoff 1970 makes a basic distinction between "symmetric" conjunction, and "asymmetric" or non-reversible conjunction of the type "Veni, vidi, vici" (see 10).

Irrespective of many unsolved problems, I wish to stress the importance of presupposition for the analysis of legal language. Thus, for the police to be able to *assert* that someone has been "murdered" (rather than "has committed suicide", etc.), some evidence must be available, and the presuppositions of such an assertion can be described as the set of *implicit* linguistic utterances that correspond to this evidence. Similarly, if a judge says "Il s'agit d'une action en résolution de vente", the presuppositions of this assertion are the set of implicit linguistic utterances which can serve to express all the conditions that need to be met for the assertion to be appropriate, or valid. In other words, a basic distinction needs to be made between what a given sentence explicitly *asserts* or *denies* and what it presupposes. Presuppositions are usually unaffected by negation : water or the like is conceptually present in "I did not wash my feet" (Fillmore 1970).

- (7) Bach's analysis of Nouns as Indefinite Pronoun + Relative Clause, and as having implicit *tenses*.
 - (a) "Vente immobilière - Action rédhibitoire - Vices de construction - Délai raisonnable" (from the summary of a judgement).
 - (a') maison = ce (qui a été construit à un moment *m*), (qui a fait l'objet d'un contrat de vente à un moment *m'*), (qui a été habité à un moment *m''*), (qui est immobilier), etc.
 - (a'') "l'assise de la construction", "ce qui faisait l'objet du contrat", "défauts cachés de la chose vendue", "habitation insalubre", "distinction fondamentale entre la vente d'une chose mobi-

lière et celle d'une *chose immobilière*", "la vente eut lieu en octobre et ce n'est qu'en juillet suivant que la dénonciation des vices fut communiquée".

- (b) époux/épouse =x=personne (qui a contracté mariage avec y à tel moment); demanderesse=x (qui a intenté une action contre y à tel moment); défendeur=y (contre qui une action a été intentée à tel moment).
 - (b') "La *demanderesse* (...) réclame l'annulation du mariage qu'elle a contracté avec le *défendeur* (...) le 27 décembre 1968. Elle expose que son *époux* n'a jamais eu l'intention de consommer ce mariage (...) Elle voit là un défaut de consentement, une impuissance complète du *défendeur* et, quant à elle, une erreur sur la *personne*. L'action a été signifiée au *défendeur* le 29 juin 1969".
- (8) Lyon's and Leech's implication :
- (a) See the relation between "*personne*" and such items as "*défendeur*", "*époux*" in (7)(b'); "*chose immobilière*" and "*maison*" in (1)(a).
 - (b) Cp. the relation between "*camions-remorques*" and "*ces véhicules*" in : "Un commerçant qui vend et distribue des camions-remorques fabriqués par un manufacturier est légalement présumé connaître les vices de *ces véhicules*".
- (9) Fillmore's presupposition, Karttunen's implicative verbs, Austin's performatives, and Kiparsky's factive verbs.
- (a) "(Action en) *annulation* de vente (de terrain)".
 - (a') Positive implication : contrat de vente de terrain.
 - (a'') Presupposition of (a') (?) : "achat de terrain".
 - (b) "(Action en) *annulation* de mariage".
 - (b') Positive implication : mariage contracté.
 - (b'') Presuppositions relatable to valid marriage (?) : "consentement ...", "intention de consommer"
 - (c) "action *rédhitoire*".
 - (c') Positive implication (?) : (existence d'un) contrat.
 - (d) "*Défaut* du vendeur d'exécuter les conditions ..."
 - (d') Negative implication : le vendeur n'a pas exécuté les conditions.
 - (e) "*L'incapacité psychologique* du mari de se décider à consommer le mariage".
 - (e') Negative implication 1 : le mari ne s'est pas décidé à consommer le mariage.
 - (e'') Negative implication 2, of (e) and of (e') : le mari n'a pas consommé le mariage.
 - (e''') Complete sentence : "L'incapacité psychologique du mari de se décider à consommer le mariage est une cause d'annulation de ce mariage à la demande de l'épouse".
 - (f) "Action en annulation de mariage".
 - (f') Time presupposition : *annulation* (can) take(s) place AFTER *action*.
 - (f'') Performatives : legal utterances having the value of legal decisions.
 - "The trial judge found that ..."

- "With these two conclusions the Court of Appeal is in complete agreement".
 - "The trial judge allowed ..., but the court regards this as ...".
 - "The evidence warrants ..."
 - "M. le juge ... est d'opinion que ... ce qu'il faut entendre par ..."
 - "La jurisprudence estime que ..."
 - "La loi impose diligence ... sous l'empire de l'article ..."
 - "C'est ce que l'on est convenu d'appeler ..."
 - "C'est ce que les auteurs modernes sont convenus de désigner comme ..."
 - "X, lorsqu'ils se posent la question de savoir ce qu'il faut entendre par ... écrivent que ...".
- (g) Factive verb : "*il appert qu'il n'a pu construire au printemps suivant la vente*".
- (g') Factive presupposition : the speaker who utters (g) commits himself to the belief that *il n'a pas pu construire au printemps suivant la vente* is a *fact* (is true).
- (h) Factive verb : "*Considérant que X*"
- (h') X is a fact.
- (i) Factive verb : "Les vices de construction qui affectaient l'appareil en question *ont été connus* par la demanderesse dès le mois de décembre.
- (ii) *les vices ...* is a fact.
- (10) George and Robin Lakoff's presupposition; Robin Lakoff's partial identity between conjoined sentences as a matter of "presupposed" information.
- (a) Note, for instance, that "*là*" refers to the *whole* of what follows "*Elle expose que*" : "*Elle expose que son époux n'a jamais eu l'intention de consommer ce mariage; qu'il était impuissant à le faire; qu'elle a vécu avec lui pendant plus de quatre mois; que, malgré ses pressantes invitations, elle n'a jamais pu l'amener à consommer ce mariage, et qu'il n'a même pas été tenté de le faire. Elle voit là un défaut de consentement, une impuissance complète du défendeur, et, quant à elle, une erreur sur la personne*".
- (b) "*Considérant que l'action de la demanderesse est mal fondée en droit; que le lien contractuel n'existe plus; que l'objet du contrat aurait dû rester en possession de la demanderesse qui l'a fait sien et qui en a disposé; "Action rejetée"*.
- (c) "... ne répugnent *ni* à la morale *ni* à l'ordre public".
- (d) Cp. discourse connectives such as : "*Ceci se justifie par maintes raisons. Qu'il suffise de rappeler que ...*"

However programmatic the above illustrations may be, it is clear, I think, that a *linguistic* approach could throw light on the *non-linguists'* use of language and indirectly on *theoretical* problems in non-linguistic disciplines such as law, which crucially depend on language use. For instance, a notion of negative implication raises the problem of which among possibilities (9)(e), (9)(e') and (9)(e'') the lawyer has in mind when he writes (11) (=9 e''') :

(11) "L'incapacité psychologique du mari de se décider à consommer le mariage est une cause d'annulation de ce mariage à la demande de l'épouse".

2.2 *Semantic sentence types.*

The notion of *semantic sentence types* to which I now wish to turn (my type C statements) is also a controversial one in at least two respects. The first type of controversy, which is illustrated in (13), has to do with what can or should be the nature, function, and form of semantic representation. A second controversy concerns the very *definition of the sentence*. In particular, the question is whether a *text* cannot be represented as a sentence. As has often been suggested, many texts seem to be paraphrasable as sentences, either by reducing sentences to nominal forms as in (11) (=9 e'') (cp. Jespersen 1933, 316) or by introducing the appropriate intersentence connectives (Katz and Fodor 1964, 490-1), in which case one is faced with the semantic problems of conjunction illustrated in (10). Unfortunately, the semantics of conjunction and of discourse connectives such as (12) (= 10 d) is still in its infancy (see however, next to Lakoff 1970 : Vinay and Darbelnet 1958, Harris 1968 and Arapoff 1970) :

(12) "Ceci se justifie par maintes raisons. Qu'il suffise de rappeler que ..."

(13) SEMANTIC SENTENCE TYPES

	Linguistic Theories	Documentation Models
(a) <i>No explicit syntax</i>	Traditional semantics	- SYNTOL, State 1 - Lawlor's "fact descriptions"
(b) <i>Abstract predicates</i> ('verbs')	"Generative semantics" Predicate-argument format : <i>X kills Y =</i> <i>Kill (X, Y) =</i>	
(i) <i>with lexical decomposition</i>	<i>Cause X Become Not Alive Y</i> (McCawley 1970)	
(ii) <i>without lexical decomposition</i>		SYNTOL, States 2-6. Format : (R _i , X, Y) for 2 ≤ i ≤ 10 E.g. R ₅ = Agent-Action relation R ₆ = Action-Object relation
(c) <i>Labelling of arguments</i>	<i>John kissed Mary with eager lips =</i> Kiss (Agent, Object,	Role indicators, etc. X-agent, Y-object (On SYNTOL and related matters,

Instrument)
(Fillmore's "cases",
1968 a, Langendoen's
"roles", 1970.

see : Cros *et al* 1964; Alouche *et al.*
1967; Gardin 1969; Bély *et al.* 1970)

Irrespective of the *formal* issue, I wish to mention a few *linguistic* advantages of directly labelling or at least specifying sentence 'roles', and, using the legal material given in (14), to illustrate this approach. First, natural language sentences appear to be constrained as to the number and nature of 'role' ('case') categories which a given 'predicate' can take. Second, it seems that there can only be *one* instance (whether simple or complex) of a given role category per sentence. Third, some roles can be left implicit, depending on the context or on other factors; e.g. the Instrument *lips* with KISS. Fourth, the grammatical relations 'subject-of' and 'object-of' can be regarded as *semantically* irrelevant. Lastly, clauses ('sentences') can function as instances of at least *some* role categories.

In (14), I present various legal examples of what might be represented as instances of *Instrumentals*, in order to conclude and further illustrate my discussion of semantic sentence types. What I assume to be Instrumental expressions is underlined, and the corresponding predicates are capitalized. I leave open the question of how the other sentence constituents could be represented. It is currently a debatable matter in linguistics whether such an Instrumental analysis has the suitable degree of abstraction or whether on the contrary it is strained. Note that some of the examples quoted below could serve as arguments for the factoring-out of abstract predicates as is done in SYNTOL : compare (14) (f), (g) and (h), in particular "est une CAUSE de" and "ANNULATION *pour cause de* ..."

(14) Semantic sentence types, for instance

PREDICATE (*Instrument, ...*)

- (a) "Ceci se JUSTIFIE *par maintes raisons*"
- (b) "Considérant que l'action de la demanderesse est mal fondée au droit; que ... action REJETEE"
(=10 b)
- (c) "L'action de la demanderesse est mal FONDEE *en droit*".
- (d) "PRISE DE POSSESSION *en vertu du contrat*"
- (e) "l'action de la demanderesse est uniquement BASEE *sur un contrat*"
- (f) "Jugement qui ANNULA la vente, *au motif que l'immeuble en cause comportant des défauts cachés*"
- (g) "ANNULATION de la vente *pour cause de vices cachés*"
- (h) "L'*incapacité* ... est une CAUSE d'annulation ..." (=11)
- (i) "L'acheteur qui ... est FONDE à demander l'annulation du contrat de vente, *s'il appert que ...*"
- (j) "Les raisons et circonstances de l'espèce EXPLIQUENT le long délai à se pourvoir en justice"
- (k) "le juge dans l'APPRECIATION du délai et de la nature du vice *pouvait retenir que "les tribunaux ..."* (?)
- (l) "responsabilité légale DECRETEE *par le Code civil*"

- (m) "les actions en dommages-intérêts RESULTANT de vices rédhibitoires"
- (n) "La mise en demeure préalable n'est pas ESSENTIELLE à l'exercice d'un recours ... quand ..."

2.3 Grammatical sentence types

Hornby's work on verb and noun "patterns" (Hornby 1954 cp. Robison 1970) and especially Zellig Harris's work on "string analysis" and related matters (Harris 1965, Sager 1967, etc.) embody a grammatical conception of sentence structure which I would regard as essential for automatic recognition. Each sentence of the language is seen as a string of contiguous words, and the grammar consists of axiomatic formulas of grammatical categories and subcategories set up to represent these strings. The fundamental distinction made in Harris's string theory between "center string" (sentence skeleton) and "adjunct" strings is of doubtful semantic relevance, as Coyaud and others have noted (Coyaud et Siot-Decauville 1967, 38). Another notion which emerges from Harris's work is, however, semantically important. It is the notion of "lexical subcategorization". This notion, together with the applicability of string algebra to mechanized indexing, will be discussed below, under the heading PROCEDURE. All I would point out here is this. Under the notion of lexical subcategorization, the problem of polysemy is reduced to one of homography (except, of course, in puns, etc.). One last point may be mentioned here, in connection with the grammatical foundations of mechanized indexing procedures. *Transformations*, in the strict technical sense of the word in Harris's or in Chomsky's theories, play no crucial role in the mechanized indexing procedures with which I am acquainted. This is in part because indexing involves discourse structures while transformations (at least in Chomsky's sense) are sentence-bound operations. Another reason may be that transformations "do not play a direct role in sentence perception", as recent psycholinguistic research by Bever and others has shown (Bever MS, 106).

3. PROCEDURE

As far as I can see, current mechanized indexing procedures are of two kinds : they can either *partially* process full texts, or attempt to produce an integral analysis of summaries of full texts such as *abstracts*. The two procedures I wish to present are concerned with abstracts. My first example of mechanized indexing system is a procedure which I set up between 1967 and 1969 (J. Noel 1968, and forthcoming dissertation). The programmes were written in PLI for the IBM 360/44 computer of the University of Victoria, B.C., Canada (R. Michélot, unpublished). The system has analyzed 50 abstracts in the field of scientific information. After a dictionary look-up operation which replaces each text word or symbol by a lexical entry of the type given below in (15 f), the machine performs step-by-step concatenations of these lexical entries. Strings of between two and six codes are rewritten as a single code, and the result

concatenation rules. The last pass concatenates the codes for the title and the sentence(s) of a given abstract and represents it as a single code corresponding to one or more classification entries. *My procedure, then, is based on two types of statements discussed in this paper : those concerning conceptual discourse structures (A.) and those concerning grammatical sentence types (D.).* The latter type of statement, which has just been referred to, is illustrated in (15) after Harris (1968, 153). (16) illustrates the workings of my indexing procedure with a hypothetical legal example, and can be compared with (17) – a crude illustration of the other procedure I wish to present here.

- (15) (a) Illustrative sentence : The proteins were treated with acid
(b) String formula as a sentence of English : N is V en in N
(c) String formula as a sentence of biochemical English : N_{mol} is V_{sol} en in N_{sol}
(d) Text word : acid
(e) Harris's subcategory : N_{sol}
(f) General form for a lexical entry corresponding to (e) : GR(ammatical code)-SEM(antic code).

(16)

INPUT text	Pass 1, 2, 3, ... 9 (codes omitted)	OUTPUT
Action		X (= code for a classification entry)
en		
annulation		
de		
mariage		
.		
L'		
incapacité		
psychologique		
du		
mari		
de		
se		
décider		
à		
consommer		
le		
mariage		
est		
une		
cause		
d'		
annulation		
de		
ce		
mariage		
à		
la		
demande		
de		
l'		
épouse		

- (17) (a) Ri(x,y) (Ignoring the PERFORMATIVE value : e.g. For the law of Québec ...)
(b) ... CAUSE ... (incapacité ..., annulation ...)

The other procedure I wish to mention has been set up by a French team, for French abstracts in the field of psycho-physiology. It is based on the SYNTOL model illustrated in table (13). To my knowledge, it is the most complete mechanized indexing procedure ever set up. Since a description of it has just been published by Bely and others (Bely *et al.* 1970) I shall only present it in very general terms. The Bely procedure embodies a very interesting attempt to *integrate three* types of statements discussed in this paper, namely those concerning : *grammatical sentence types*, *conceptual discourse structures*, and *semantic sentence types*. In particular, the Bely procedure proposes a very original use of SYNTOL syntax for stating conceptual structures of *discourse*. Moreover, computer experiments have been carried out with the SYNTOL model by Alouche *et al.* (1967) to deal with at least *some* aspects of what I have called *implicit intersentence relations*, so that the Bely procedure could very well have been extended to handle the *fourth* type of statement discussed in this paper.

Let me conclude on two general points :

1. The many interesting features of the French mechanized indexing procedure should not obscure a fact which I have tried to suggest in this paper. My experience with a mechanized indexing procedure for abstracts in the field of scientific information has convinced me that no breakthrough in mechanized indexing research will be possible without considerable progress in certain areas of linguistics — in particular, the form of *lexical entries* and, more generally, the form of the *base component* of linguistic theory. This conclusion is supported by the general feeling that certain fields of the human sciences (such as law) are less amenable to mechanized analysis than various fields in the natural sciences. If I am correct, further work in some areas of theoretical linguistics must be regarded as a prerequisite for coming closer to Gardin's ideal of a "complete" procedure that would reduce the indexing operation to *mechanized* and *reversible* rules.

2. Bernard Pottier recently argued that " 'pure linguistics' is dead" (Pottier 1968, 40). Recent American work in linguistics seems to confirm this pronouncement — in particular work around the notion of *presupposition*. The distinction, with which Chomsky and many others had worked, between linguistic and non-linguistic competence tends to be given up by more and more linguists. As a result, the problem of what linguistics is about appears to be far more complex than many linguists had thought in the mid-sixties. It is my belief that some of the answers to this question will come from research in mechanized indexing — particularly in the human sciences — since such research is essentially concerned with a study of the indexers — and, more broadly, the scientific communities — "*double competence*".

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NOTE

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