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Abstract

The standard *relational* analysis of attitude verbs assumes that they denote a relation between an experiencer and an abstract object. The fact that these objects have only a shadowy linguistic manifestation has led to a rejection of this kind of analysis. I show here that the relational view can be preserved if one complicates substantially the lexical constraints which control the construction of semantic interpretation and separates in particular the *lexical* objects selected by the verbs (e.g. objects of type **human** in *John believes Mary*) from the *ontological* objects of attitude, which lead a more secret life, apart from the lexicon, inside rich interpretation structures, a fact which accounts for their well–known resistance to ordinary linguistic tests.

1 Introduction

It is currently assumed that attitude verbs express a relation between an experiencer and an abstract object, such as a proposition or a fact.[1] For instance, *John believes that the universe is expanding* is true if and only if John is in the belief relation to the proposition that the universe is expanding. However, there are at least two reasons to challenge this simple view. First, if the objects of attitudes are abstract objects, and if such objects can be denoted by abstract nouns such as *proposition* or *fact*, where does their well–known resistance to nominal paraphrase come from? Second, some recent approaches have cast doubt on the idea that the object of attitudes are abstract objects, in part because there is no direct linguistic access to them. My aim in this paper is to clarify this issue by showing that we have to *complexify* substantially the description of abstract objects as arguments of attitudinal relations. In section 2, I will present attitude verbs in French and give an idea of the problems simple relational analyses encounter. In section 3, I will show how to survive those problems through an elaboration of the intuitive notion of object of attitude.

2 Attitude verbs and their problems

2.1 Attitude verbs in French

Attitude verbs (AV) denote intellectual or emotional attitudes (belief, doubt, fear, etc.) towards some content. In French, most of them have *que*–clause and NP complements, as in (1a,b).

(1)   a.   Jean croit que l'universe est fini ('John believes that the universe is finite')
      b.   Jean croit Marie ('John believes Mary')

Other constructions involve infinitive clauses for subject control verbs, as in *Jean croit être le plus malin* ('John believes to be the smartest') or *Jean s'engage à rester président*

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[1] See (Taylor 1998:282–290) for a brief but clear presentation of this view.

(lit. 'John commits himself to remain president'), and PP's, as in *Jean doute de la victoire*, ('John has doubts about the victory'). There are also adjectival copular constructions *être* + ADJ and light verb constructions (*éprouver de la crainte devant* NP, lit. 'to experience fear with respect to' NP). Emotional attitude verbs can be distinguished from intellectual attitude verbs by noting that they essentially coincide with the subclass 1 of Mathieu's (2000) emotion verbs, which enter the construction NP1 V NP2, where NP2 is the cause (or the starting point) of the feeling experienced by NP1.[2] A traditional question about AV's is: what do we believe, fear, like, etc.? The standard answer is that there is a relation R_A, where A is the attitude, which holds between the experiencer and an abstract object such as a proposition, a fact, a possibility, etc.

2.2 Back to semantic innocence?

This answer raises two problems.

First, as frequently noted, abstract objects are sometimes impossible to designate by abstract classifiers, such as *proposition, event, fact*, etc. Moltmann (1999) and Ginzburg and Sag (2000) mention many cases of designation failure. For example, *proposition* may not be the complement of *remember* (*John remembers* #*the proposition that S*), although *remember* might be assumed to have a propositional argument. Moltmann goes as far as rejecting the relational analysis on such grounds. She notes that, in addition to the well–known substitution failure, (i) there are English verbs, such as *to claim* for which no abstract classifier seems appropriate and (ii) there is in some cases a sharp difference in interpretation between the *that*–clause and the NP complements. *John remembers* #*the proposition that* S describes the fact that John's memory is about some proposition, not that he remembers that S. This *objectivization effect*, as Moltmann calls it, signals that the

semantic nature of the argument is quite different.

Second, even when there is no objectivization effect, there is often a difference between the clausal and the nominal complement. E.g., while *J'affirme que Marie est arrivée* ('I assert that Mary has arrived') is standard, *J'affirme* [??]*l'arrivée de Marie* ('I assert Mary's arrival') is strange. This contrast suggests that *affirmer* selects only for propositions, not for events. So, in *J'affirme mon intention de* VP ('my intention of VP'), the NP complement would be propositional. However, certainly, *croire* ('to believe') accepts propositional complements. Yet, it does not accept a NP headed by *intention* (*Jean$_i$ croit* [??]*son$_{j \neq i}$ intention de* VP). Summarizing, such (and many other data) point to the implausibility of a simple relational analysis, based on a handle of abstract objects targeted by the various AV's. The absence of a fully articulated relational analysis leads to the defence of a certain 'semantic innocence'.[3]

For instance, Moltmann rejects the relational approach in favor of a syncategorematic analysis, in which information from the attitude verb and from the propositional content are combined into a flat structure (2). This change is intended to capture the observation that propositional objects have no independent existence.

(2) Let V_{att} be some attitude verb, let $\langle P, t_1 \ldots t_n \rangle$ be the propositional content of some sentence S, V_{att} *that* S is represented as $\lambda x.\ att(x, P, t_1 \ldots t_n)$.[4]

The more standard representation $att(x, \phi)$, where ϕ is an abstract object corresponds to the objectivization effect, in which the object enters a relational structure without flattening. NPs like *John's belief/claim that* S denote *attitudinal objects* which result from abstracting from an agent and an attitude.

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[2]We ignore here the case of obligatory 3rd person constructions with certain AV's: *Jean* [*]*implique que* S vs *Ce théorème implique que* S ('[*]John/this theorem entails that' S).

[3]I borrow the expression that Barwise and Perry apply to their non–Fregean situation semantics, based in part on a certain diffidence about abstract entities.

[4]Note the representation is actually obtained by chaining the two lists $\langle x \rangle$ and $\phi = \langle P, t_1 \ldots t_n \rangle$.

(3)   **Existence of attitudinal objects**
Let $\hbar$ be the abstraction function, then an attitudinal object $\hbar(att, \phi, x)$ exists iff $att(\langle x \rangle \cdot \phi)$.

Attitudinal objects form the domain of quantification of special quantifiers. There is no need to postulate a different analysis for attitudinal objects and *that*–clauses, however, as illustrated in the representation for *something*.

(4)   **Something**
x V_{att} *something* corresponds to
$\exists y, \phi(y = \hbar(att, \phi, x)$ & $att(\langle x \rangle \cdot \phi))$

The strangeness of certain attitude combinations (e.g *John believes what Mary $^{??}$ hopes*) is explained by the attitudinal object type conflict triggered by:
$\exists y(y = \hbar(believe, \phi, \text{John})$ & $y = \hbar(hope, \phi, \text{Mary})$ & ...).

In Moltmann's account, abstract objects have only a derivative status (as attitudinal objects), through the abstraction operator $\hbar$. Forbes (2000) goes even further by denying any existence to abstract objects for emotional predicates such as *fear*. He proposes that, in a sentence like *John fears Mary*, John fears Mary *qua* Mary, that is, under a certain representation of an individual, this representation being labeled by the proper noun *Mary*. So, the semantic content of the object noun is 'absorbed' into the attitude. What John fears is not some possible behavior or property of Mary, in addition to those who define the representation of Mary.

2.3   Semantic innocence revisited

Although they are technically different, these two proposals share the view that the standard relational view is faulty because it posits abstract entities whose status is obscure. Their dismissal of abstract objects as first class citizens of the semantic ontology is appealing because it reflects the *de facto* difficulty of defining abstract objects in a precise way. However they also run into problems.

First, consider (1b). A natural paraphrase is *John believed what Mary said/claimed/asserted*, etc. In the literature

on constructional polysemy and generative lexicon (Copestake & Briscoe 1995, Pustejovsky 1995), it is often assumed that, in some cases, semantic interpretation uses information *associated* with a NP, rather than what is, *prima facie*, the NP bare semantic content. If what Mary said is associated with *Mary*, we can represent (1b) as (5).

(5) $\exists x, \phi(x = \hbar(believe, \phi, \text{John}) = \hbar(say, \phi, \text{Mary})$ & $believe(\langle \text{John} \rangle \cdot \phi)$ & $say(\langle \text{Mary} \rangle \cdot \phi)$

The problem is that this representation somehow begs the question. *say* is an attitude which we assume to be compatible with *believe* in (5). But there are other attitudes with the same property, such as *think* or *believe* itself. However, (1b) may not mean 'I believed what John believed/thought/assumed', etc. To prevent such unwanted interpretations, we would have to add the implausible assumption that what people say is 'more' tightly associated with them than what they believe, think, assume, etc. A similar problem arises with *craindre* ('to fear', 'to be afraid'). With a *que*–clause, *craindre* can bear on plausible past events, as in *Je crains que Jean n'ait échoué* ('I am afraid John failed'). With a NP complement, *craindre* bears on possible future events. So, *Je crains l'échec de Jean* ('I fear John's failure') can only mean that the speaker fears that John might fail, not that he probably failed. It is hard to see how an explanation in terms of association strength could help us to separate the two cases.

Let us now consider (6a,b).

(6)   a.   Je soutiens l'idée que l'univers est en expansion ('I claim the idea (= I contend) that the universe is expanding')
b.   J'ai avancé la thèse que l'univers était en expansion ('I put forward the view that the universe is expanding')

L'idée que ϕ and *la thèse que ϕ* would be attitudinal objects in Moltmann's sense. Yet,

there is no objectivization effect, unless one shifts the sense of the verb and interprets *soutenir* ('to contend') as 'to support'. This parallels the fact, mentioned by Moltmann, that some verbs allow for abstract object complements (*to believe the proposition that*). Such data suggest that some attitude verbs select attitudinal objects of certain semantic types, which agrees with recent semantic descriptions of abstract objects (Ginzburg & Sag 2000, Jayez & Godard 1999). What is the semantic form corresponding to such cases? It seems that we can simply reuse the analysis of special quantifiers proposed by Moltmann and assign to (6b), for instance, the form (7), assuming that the *soutenir*–attitude and the *idée*–attitude (noted by *entertain*) are compatible.

(7) $\exists x, \phi(x = \hbar(entertain, \phi, \text{speaker})$ & $contend(\langle\text{speaker}\rangle \cdot \phi))$

In virtue of the existence condition on attitudinal object (3), we have a similar form for a sentence like *je crois que* ϕ, namely:

$\exists x, \phi(x=h(believe, \phi, \text{speaker})$ & $believe(\langle\text{speaker}\rangle \cdot \phi))$.

Yet, a sentence like *Je crois *la croyance que* ϕ ('I believe the belief that ϕ') is totally impossible in French, even in a register of poetic emphasis. In the same vein, *Je pense la *croyance/*l'idée que* ..., *I think the *idea/*belief that* ..., *J'espère *l'espoir que* ..., *I hope *the hope that* ..., etc. are simply not French or English sentences. If, in (6a,b) the NP complement was simply the reflection of the attitude in attitudinal object, by the same representation, we would predict those weird sentences to be acceptable. So, it seems that a treatment based on attitudinal objects does not shed much light on the status of NP complements

Forbes's analysis suffers from a similar problem. Suppose that I am reading the disturbing bulletin of some violent sect. It would be more natural to say *this text frightens me* than *I* $^{??}$*fear this text*. Yet, this text frightens me in virtue of being the text it is. The problem is that texts do no contribute to the construction of appropriate abstract objects for *fear* the way persons do. By and large, we

fear events or persons as being, through their course or action, the (indirect) cause of undesirable states of affairs. For instance, I can fear John because he makes blunders, that is, because he behaves (action) in a way which can lead to disastrous results. Analogously, I fear a travel because, in its course, it can have some negative consequences. A text is neither an event nor the agent of some potentially problematic state of affairs.

The mentioned problems stem from a confusion between two –externally similar but actually different– points of view. On one side, there is the idea that attitude predicates do not necessarily select the abstract objects denoted by abstract classifiers (*proposition*, etc.). On the other side, there is the (much stronger) claim that attitude predicates do not involve abstract objects.

In between, there is the possibility that (i) attitude predicates involve different abstract objects in different constructions (e.g. NP vs clausal complements) and that (ii) these objects elude traditional taxonomies in terms of proposition, fact, etc. The previous observations lead one to endorse this view. I propose, in line with (Godard & Jayez 1993, Jayez & Godard 1995) to distinguish between two different dimensions of semantic interpretation. 1. The type of entities that predicates *select* in various constructions. E.g., *croire* selects the type **human** in its NP construction. We will call those types the *selected* types (s.t.). 2. The way in which an entity of a given s.t. is involved in an interpretation constructed from the predicate and the s.t. This mode of involvement corresponds loosely to the syncategorematic approach of Moltmann, the main difference being that it does not prevent some abstract object to appear somewhere in the interpretation. For instance, in section 3.2, it is shown that in the NP complement construction, the s.t. **human** triggers the construction of a complex structure. Roughly speaking, (1b) is interpreted as 'John believes the description of certain events offered by Mary´.

Consider *craindre* and *fear*. They select in particular animate NP's. However, the s.t. does not produce the interpretation of *fear*

described above. When the distinction between selection and interpretation is applied to Forbes's analysis, we see that (i) Forbes is right when he says that, literally, *John fears Mary* means that John fears the entity denoted by the NP *Mary*, because this NP is of one of the s.t. of *fear* (namely **animate**) but that (ii) he is not so right about the interpretation of the sentence. John does not simply fear Mary through some undetermined representation of her. He fears Mary as the possible cause of some future unpleasant event. While there is still a fair amount of indeterminacy as to what Mary might cause, the representation where she plays a role is not entirely unspecified. Actually, what John fears is the undesirable event(s) that Mary might trigger. One may retain the gist of Forbes's proposal (to fear x is to fear x *qua* $\phi(x)$) and avoid its problems by assuming that, when it selects an **animate**, *to fear* has the predicative structure corresponding to (8). In this definition, we distinguish the verb *to fear* which is characterized by its s.t. and its interpretative constraints from the attitude itself, that we note $FEAR$.

(8) x *fears* y iff x believes that y can cause some future event z which x $FEAR$.

Note that, if y is an event and we assume that the causation relation is reflexive, x can *fear* y and $FEAR$ y. It is certainly semantically innocent to say that x literally fears y. However, it is semantically naive to believe that y can be just anything which can be conceived as frightening. With *croire*, the situation is similar. It is semantically innocent to say that John literally believes Mary in (1b) but it is semantically naive to thereby dismiss the intuition that to believe is to think that something is true. *Croire* does not select simply objects which can be true or false, since Mary, in (1b), cannot be true or false. However, some attitude verbs (including *croire*) select objects of type σ (the s.t.) which are related to objects which can be true or false in a certain way, determined by the verb and σ. In certain cases, this relation might be the identity. For example, (6a) would be possible because

the lexical type of *idée* is identical to or subsumed by (at least) one of the s.t. of *soutenir*. In other cases, the relation is more indirect, as demonstrated in section 3, but there is still a direct relation between the experiencer of the attitude and the abstract object which is connected to the NP complement by the indirect relation. Noting R this relation, we can construct for *croire* a condition corresponding to (8)

(9) x *croit* y iff, for some z, z is connected to y by the relation R (possibly the identity) and x $CROIT$ z (= thinks that z is true).

One might argue that (9) cannot be applied in some cases. For instance, consider (1b). As noted above, a natural paraphrase thereof is *John believes what Mary said/claimed/asserted*, etc. Yet, if John believes what Mary asserted and if what Mary asserted is a certain proposition, how is it that substitutivity fails in (10)?

(10)   A – Jean croit ce que Marie a asserté ('John believes what Mary asserted')
B – Mary a asserté la proposition que l'univers est fini ('Mary asserted the proposition that the universe is finite')
C – Jean croit [??]la proposition que l'univers est fini

To account for such substitutivity problems, we have to keep separate the s.t.'s and the types of abstract objects occurring in the interpretation. Jayez and Godard (1995) suggest that, in general, 'generative' interpretation (Copestake & Briscoe. 1995, Pustejovsky 1995) must be sensitive to the construction in which it occurs and to the s.t.'s of the predicate or modifier. (11) is intended to capture this sensitivity.

(11)   **S.t.'s and interpretation**
For any predicate P and construction C, if P selects $\sigma_1 \ldots \sigma_n$ in C, the description which expresses the interpretation relative to a s.t. σ_i is a function of the s.t. and of the construction (i.e., it has a general form $I(P, \sigma_i, C)$. If

$\tau \notin \{\sigma_1 \ldots \sigma_n\}$, then $I(P, \tau, C)$ is undefined.

The constraint (11) takes care of (10). In the NP complement construction, *croire* simply does not select any type subsuming that of the noun *proposition.* The failure of substitutivity is not the effect of some mysterious semantic mismatch.[5] The *CROIRE* attitude bears on propositions but the verb *croire* does not denote this attitude. Assuming at this stage that (1b) means that John believes what Mary says or said (we will see below that the status of *croire* is more complex), the abstract object on which the attitude bears is what John *CROIT*, namely that what Mary says is true. *Jean croit Marie* = if z is what Mary said, John *CROIT* the proposition that z is true. So, the abstract object involved is a proposition, namely the proposition that z is true.

This discussion suggests that attitudes can concern abstract objects, which are not attitudinal objects, that is, which are not abstracted from the attitude and the content, and which I call objects of attitudes (o.a.).

(12) **Objects of attitudes**
Let V_{att} be an attitude verb, NP V_{att} XP is appropriate iff the lexical type of XP is identical to or subsumed by some s.t. of V_{att} and there exists a z such that (i) z is connected to the semantic content of XP by some relation defined by the interpretation constraints of V_{att} and (ii) $att(x, z)$, where x is the semantic content of NP. z is called the *object of attitude* with respect to V_{att}.

Summarizing, the analysis I propose has two main features. On one hand, it is extremely conservative, since o.a. are those entities which are related to the experiencer through the attitude, exactly as in the standard relational analysis. On the other hand, it posits a distinction between selection, which does not require that the s.t. be the type of the o.a., and interpretation where o.a. are connected to the selected object through some informational relation. It is at the level of interpretation that o.a. are related to the experiencer. I now turn to the constraints which regulate interpretation, in particular to the role of lexical typing.

3 Lexical types and interpretation

A lexical type is a set or hierarchy of constructions. For instance, it is usually assumed that the type **proposition** for English nouns corresponds to the following combinatorial possibilities: **proposition** nouns can be modified by adjectives such as *true, false, dubious*, etc. They can be the complement of *defend, attack*, etc. They can be referred to by NP's like *this proposition.* Limiting ourselves to this simplistic sample, we see that (at least) three types of property may be relevant for an item X, namely which modifiers are compatible with X, which items X can be complement of and which lexical paraphrases are possible for X. In most recent syntactic and semantic formalisms, the local information attached to lexical items or phrases is structured by attribute–value bundles, and this is the approach we will follow here, using typed feature structures (Carpenter 1992, Richter 2000) in the HPSG framework (Pollard & Sag 1994, Sag & Wasow 1999, Ginzburg & Sag 2000). Lexical functions, in the sense of (Mel'čuk 1996), are introduced to connect local informations and define distributional constraints.

3.1 Lexical constraints

How do we express the different (in)compatibilities which make up the lexical profile of a type? First, remember that, in typed feature structures there is a distinction between constraint sets (called *descriptions* by Carpenter (1992)) and actual structures which instantiate the descriptions.

(13) **Descriptions** Let $\mathcal{A}$ a set of attributes and Σ a set of types. Paths π, π', etc. are finite sequences of attributes. Descriptions are defined recursively by:
1. The empty description Λ is a de-

[5]A similar point is made by Devlin (1991:191) about seeing.

scription.[6]

2. Any $\sigma \in \Sigma$ is a description.

3. Any equation $\pi = \pi'$ is a description.

4. If Δ is a description or a finite set of descriptions, any expression $\pi : \Delta$ is a description.

5. If $\langle D_1, \ldots, D_n \rangle$ is finite list of descriptions, $\pi : \langle D_1, \ldots, D_n \rangle$ is a description.

6. The negation of a description, noted $\neg D$, is a description and any boolean combination of descriptions is a description.

We note $D' \preceq D$ the fact that $D = D'$ or that, for some description D'', $D = D' K D''$, where K is a boolean connective.

Note that the intuitive meaning of $\sigma \preceq D$ is that D is of type σ. We assume that types occurring in description are partially ordered by a subsomption relation $\sqsubseteq$. $\sigma \sqsubseteq \tau$ means that σ contains at least as much information as τ. For an elementary illustration, consider an adjective like *true*. In simple versions of HPSG (Sag & Wasow 1999), it gets a path SYN|HEAD|MOD or, $-$|MOD for short, which gives accesses to the type of the lexical entities it can modify. So, *true* (considered as a feature structure) should satisfy the description $D = \langle -|\text{MOD} : \textbf{proposition} \rangle$. Since we want to define the type **proposition** through its distributional properties, we need in fact to go from nouns which get this type to their possible modifiers. This is what lexical functions allow one to do. In this example, a lexical function $modADJ\_of$ would return, for each noun, the adjectives which can modify it. For nouns, we can define a constraint schema connecting descriptions and lexical functions as follows.

(14)   For any noun n described by D_n, $X \in modADJ\_of(D_n)$ iff there exist two types σ and u such that $\sigma \preceq D_n$, $(-|\text{MOD} : u) \preceq D_X$ and $\sigma \in u$ or $\sigma \sqsubseteq u$.

(14) says that a noun of type σ can be modified by an adjective X if and only if this adjective modifies nouns of a set of types which includes σ or of a type which subsumes σ. The coexistence of standard descriptions and of lexical functions makes it difficult to define lexical types in a general way. We can circumvent this by assuming that lexical functions are attributes. In (14), for instance, the function $modADJ\_of$ might be translated as the head feature MODADJ-OF and incorporated directly into the noun description. I assume in addition that there is a special head feature DIST which contains the lexical typing information. One can then propose the following description for, say, the noun *account*:

$<$SPELLING : *account* &
SYN|HEAD|DIST|MODADJ-OF : $<$SPELLING : *true* & SYN|HEAD|DIST|MOD : (**noun** & **proposition**) & ... $>$ & ... $>$

Note that, since an expression $\pi : \{D_1 ... D_n\}$ counts as a description, we can declare as the value of $-$|MODADJ-OF any set of adjectives. Things are not always so simple, however. Consider the following version of Quine's subtitutivity test as used by Ginzburg and Sag (2000).[7]

(15)   **Substitutivity**   Let S be a true sentence in which a nominal abstract classifier N (such as *proposition, fact*, etc.) occurs as the complement head of an attitude verb V and S' an equative true sentence of form *the* N *is* XP indicating the content of the noun, then it is also true that S'', where S'' is the result of substituting XP for the complement of the attitude verb in S.

For instance, from *John revealed a perplexing fact* and *the fact is that Oscar was not at home on Tuesday*, it follows that *John revealed that Oscar was not at home on Tuesday*. Although such tests involve the syntactic structure of sentences, they are basically inferential and may not be described in terms of purely lexical/phrasal constraints. Enriching the representation language to express criteria of this kind is, if possible at all, extremely complex. I will assume here that the sensitivity to such tests is coded by atomic types.

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[6]By definition, the empty description is satisfied by any feature structure.

[7]The test's formulation is relativized to attitude verbs

We are now ready to define lexical types. Descriptions can be typed exactly like feature structures. There are several different reasonable ways of defining types for attribute–value bundles. I will simply assume that the type of the description D is the least general type σ such that, if T is a typed feature structure satisfying D, T is of type σ in the sense of Carpenter. Two types are incompatible when they are incomparable, that is, none of them subsumes the other.

(16)   Let D be the description associated with a certain lexical or phrasal sign, we say that it is of *lexical* type σ, which we write $D :_{lex} \sigma$ iff (SYN |HEAD |DIST : D') $\preceq D$ and D' is of type σ.

In definition (16), DIST is a head feature. The *Head Feature Principle* (HFP) of HPSG stipulates that, in any headed phrase, the head value of the head daughter and the head value of the mother must be identified. So the lexical type of a head and of its projections are the same.[8] However, nothing prevents in principle modifiers and specifiers to act upon the value of DIST.

3.2   Selection and interpretation

Consider the French verb *croire* and the two constructions illustrated in (1).[9] The clausal complement construction seems to point to a relation between John and the proposition that the universe is expanding. However, in French, there is a sharp contrast between pronominal anaphora and NP headed by *proposition* in the case of *croire*.

(17)   a.   On suppose généralement que l'univers est en expansion, et Jean le croit ('It is currently assumed that the universe is expanding and John believes it')
        b.   On suppose généralement que l'univers est en expansion, et Jean croit cette $^{??}$proposition ('...and John believes this proposition')

The observation generalizes to other abstract classifiers: *croire* $^{??}$*cette idée*, $^{??}$*cette théorie*, $^{??}$*cette conception*, etc. This is all the stranger because such nouns can be used in appositive structures such as *la proposition/l'idée que l'univers est en expansion* ('the proposition/idea that ...'), which may not be complements of *croire*. This suggests that nominal complement constructions of *croire* are essentially different from clausal complement constructions, a fact which echoes the well–known observation of Barwise and Perry (1983) for perceptions verbs like *see*. In other terms, one does not believe (exactly) the same thing when one *croit que* S and when one *croit* NP. In fact, since the attitude verb may be sensitive to the type it selects, we must conclude that the noun *proposition* has a lexical type which is not recognized by the interpretation function as a legitimate starting point to construct an interpretation, *even if* this would make sense in an ontology of abstract objects. Let us see how ontology and lexical typing diverge in the case in *croire*.

Croire accepts NP complements headed, for instance, by *histoire*, *récit* ('story'), *dires* ('sayings') or *allégations* ('allegations'). Those nouns denote sets of assertions which describe sequences of episodic events. They may not denote assertions which describe generic or analytical truths.

(18)   Jean prétend que tous les chats sont névropathes, mais son $^{??}$*histoire*/$^{??}$*récit* n'est pas vraisemblable ('John claims that all cats are neurotic, but his story is not plausible')

Let us label **eventsdesc** the type assigned to those words. In contrast, nouns like *discours* or *allocution* ('speech' in the sense of public declaration) are much less natural with *croire*.[10] This is presumably because, although speeches can contain assertions, those assertions are not necessarily about real events. That event description is a

crucial dimension of NP complements of *croire* is evidenced by the following contrast.

(19) a. Jean m'a expliqué comment il avait redressé la boîte, mais je n'ai pas cru son histoire ('John told me how he had rescued the company, but I didn't believe his story')

b. Jean m'a expliqué comment il fallait redresser la boîte, mais je n'ai pas cru $^{??}$sa politique ('John told me how to rescue the company, but I didn't believe his policy')

In 19a, John describes what happened. In 19b, he indicates a way of doing things, referred to by *sa politique*, which may not be the complement of *croire*, even when, as in this case, it can denote a set of assertions. It is often assumed (see for instance Ginzburg & Sag 2000), that nouns of type **proposition** can combine with predicates expressing truth or falsity. Nouns of type **eventsdesc** can be modified by *vrai* ('true') and *faux* ('false'). They are also compatible with adjectives like *véridique* ('veridical'), *fidèle* ('true' in the sense of *true to facts*) or *mensonger* ('untrue'). However, some verbs which select the type of *proposition* do not accept complements of type **eventsdesc**. For instance, we have *soutenir un idée* but *soutenir un* $^{??}$*récit*. This indicates that *proposition* and its mates (*idée*, *conception*, *opinion*, *théorie*, etc.) do not just characterize truth–bearers but truth–bearers of a speculative nature. A proposition or an idea are not about what happened but rather about what holds in some actual or ideal situation, whence the incompatibility of related words with adjectives which evaluate the quality of an event description: *une idée* $^{??}$*fidèle*, $^{??}$*véridique*, $^{??}$*mensongère*. In fact, the type assigned to *proposition* entails ¬**eventsdesc**. Let us assume that descriptions, like typed feature structures, can include nonmonotonic information, along the lines of (Lascarides et al. 1996) and (Lascarides & Copestake 1999). Concretely, a description has a head which contains non–defeasible information and a tail where defeasible information is stored. The following principle warrants that description are defea-

sibly complete.

(20) **Closed World Assumption for descriptions**
Let D/D' be a nonmonotonic description, where D is the head and D' the tail. If $(\pi : D_1) \preceq D$ then, for every D_2 such that $(\pi : D_2) \not\preceq D$ and $D_1 \not\sqsubseteq D_2$, $\neg(\pi : D2) \preceq D'$.

For instance, *idée* gets a description like (α)

(α) $<$SPELLING : *idée* & SYN|HEAD|DIST|MODADJ-OF : $<$SPELLING : *vrai* & $\ldots$ $>$ & $\ldots$ $>$ / D'

If we assume that $<$SPELLING : *vrai* & $\ldots$ $>$ $\not\sqsubseteq$ $<$SPELLING : *fidèle* & $\ldots$ $>$, we conclude from (20) that D' has the form (β)

(β) $<$ ¬SYN|HEAD|DIST|MODADJ-OF : $<$SPELLING : *fidèle* & $\ldots$ $>$ & $\ldots$ $>$

In virtue of (16), if *idée* cannot be modified by *fidèle*, it may not be of a type comparable to that of, say, *récit*, since the two descriptions contain two contradictory subdescriptions of form $\pi : D$ and $\neg\pi : D$.[11] So, if *croire* selects **eventdesc**, it may not accept NP complements like *idée*, whose type is incompatible with **eventdesc**. If NP2 is headed by an **eventdesc** noun, NP2 *croit* NP2 means that NP1 *CROIT* that NP2 is true. Afficionados of the theory of so–called *Austinian* propositions[12] developed in situation semantics (Barwise & Etchemendy 1987) will rightly point out that, under this characterization, o.a. of *CROIT* are Austinian propositions, that is, they involve a description *and* the situation with respect which the description is evaluated. Following this lead provides us with a convenient definition (see Ginzburg & Sag 2000, for a more general discussion).

(21) The interpretation of NP1 *croit* NP2, where NP2 is of type **eventdesc**, is

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[11]The formal situation is more complex since the treatment of negation in feature structures is not elementary. Anyway, every reasonable semantics of descriptions predicts (at least) that no two *locally contradictory* descriptions, containing $\pi : D$ and $\neg(\pi : D)$ respectively, can be satisfied by the same feature structure.

[12]The adjective is assumed to be a tribute to the descriptive/demonstrative distinction introduced in (Austin 1950).

that NP2 *CROIT* the proposition involving NP2 (*qua* description) and the situation to which NP2 refers.

Let me emphasize that the interpretation is sensitive to the *type* of NP2. A more rigorous formulation of (21) is (22). The type **croire** corresponds to the verb *croire*. It has two appropriate attributes, BELIEVER, whose values must be subsumed by **human**, and BELIEVED, whose values are subsumed by the least general type which subsumes all the lexical types of possible NP complements of *croire*. The type **CROIRE** has two corresponding attributes: *BELIEVER* (which happens to share its value with BELIEVER in (22)), and *BELIEVED* whose values are of type **prop**. The ontological type **prop** is not to be confused with a lexical type **proposition** (if any); **prop** has three attributes which point to the reference situation, to its description (NP2) and to the satisfaction relation (the situation supports the description) (see Ginzburg & Sag, 2000 for a much more detailed treatment of propositions)

(22) For any description D, <u>if</u>
SEM$|\pi$: **croire**,
SEM$|\pi|$BELIEVER : D_1,
SEM$|\pi|$BELIEVED : D_2 and
D_2 : **eventdesc**
$\preceq D$,
<u>then</u>
SEM$|\pi$: **CROIRE**,
SEM$|\pi|BELIEVER$ = SEM$|\pi|$BELIEVER,
SEM$|\pi|BELIEVED$: **prop**
SEM$|\pi|BELIEVED|$SIT : **sit**,
SEM$|\pi|BELIEVED|$DESC = SEM$|\pi|$BELIEVED and
SEM$|\pi|BELIEVED|$RELN : **support**
$\preceq D$.

The constraint (22) connects the presence of a certain lexical type (**eventdesc**) for the NP complement and the o.a. of type **prop**. Note that the special quantifier behavior observed by Moltmann (*John believed what Mary* [??]*hoped*) receives a simple explanation: the object ($\neq$ o.a.) corresponding to *what Mary hoped* is not of type **eventsdesc**,
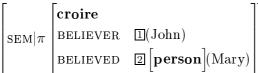
in contrast to *what Mary said*.

Things get a little more complicated when one considers (1b). First, there is a further level of indirection. To believe Mary is to believe something that Mary said, asserted, claimed, in other words, something that she communicated.[13] As already noted, *croire* is not appropriate if Mary simply imagined or considered something. One cannot *croire* the private mental states of Mary. Second, the fact that Mary communicated something is presupposed. For instance, the presupposition is preserved under negation (*Jean n'a pas cru Marie* entails that Mary communicated something), *if*–clauses (*Si Jean a cru Marie*, S entails that Mary communicated something). It is also suspended in typical suspension/cancellation environments for presuppositions (*Si Marie l'a dit à Jean, il l'a crue,* 'If Mary told John, he believed her'). Third, what John *CROIT* in (1b) is not necessarily that what Mary communicated is true, as evidenced by (23).

(23) Jean croit Marie, mais il pense qu'elle se trompe ('John believes Mary, but he thinks she is wrong')

(23) has an interpretation in which Mary communicated something which John does not believe to be true, although he believes that Mary is *sincere*. This distinction is partly analogous to that alluded to above about perception reports in situation semantics (Barwise & Perry 1983). If John sees Mary run, he sees something that one can describe as John running. However, John might be unaware that it is Mary who runs and believe that it is somebody else, for instance. In contrast, if John saw that Mary ran, John believes that it was Mary who ran. In (23), John believes that Mary correctly described what she thinks to be true, not necessarily that she correctly described what is true. This corresponds to the following constraint, where we adopt a typed feature structure presentation to keep things readable. (24) says that the believer (John in
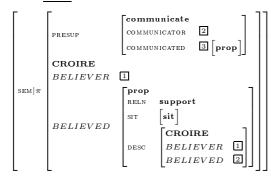
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[13]Additional evidence includes the possibility of *rumeur* ('rumor') or *racontars* ('gossip') as complements of *croire*.

the example) *croit* some person (Mary) and *CROIT* the proposition that Mary *CROIT* that the proposition whose communication is presupposed ($\boxed{3}$) is true.

(24)   <u>if</u> D contains the information

$$\left[\text{SEM}|\pi \begin{bmatrix} \textbf{croire} \\ \text{BELIEVER} \quad \boxed{1}(\text{John}) \\ \text{BELIEVED} \quad \boxed{2}\left[\textbf{person}\right](\text{Mary}) \end{bmatrix}\right]$$

<u>then</u> it also contains the information

$$\left[\text{SEM}|\pi \begin{bmatrix} \text{PRESUP} \begin{bmatrix} \textbf{communicate} \\ \text{COMMUNICATOR} \quad \boxed{2} \\ \text{COMMUNICATED} \quad \boxed{3}\left[\textbf{prop}\right] \end{bmatrix} \\ \textbf{CROIRE} \\ \textit{BELIEVER} \quad \boxed{1} \\ \textit{BELIEVED} \begin{bmatrix} \textbf{prop} \\ \text{RELN} \quad \textbf{support} \\ \text{SIT} \quad \left[\textbf{sit}\right] \\ \text{DESC} \begin{bmatrix} \textbf{CROIRE} \\ \textit{BELIEVER} \quad \boxed{1} \\ \textit{BELIEVED} \quad \boxed{2} \end{bmatrix} \end{bmatrix} \end{bmatrix}\right]$$

The importance of constructions is demonstrated by the differences between the selection properties of *croire* in a finite clause or an infinitival and its properties in the expression *à en croire* NP ('if one believes' NP).

(25)   a.   A en croire Marie/le récit de Marie, S ('If one believes Mary/Mary's story,' S)

b.   A en croire le vocabulaire en usage ici, ils étaient les maîtres de la tradition figurative[14] (lit. 'If one believes the local parlance, they were the masters of the Figurative Art tradition')

c.   Jean croit [??]le vocabulaire de Marie (lit. 'John believes Mary's parlance')

(25b,c) exemplifies the divergence between the two mentioned constructions. (25c) is odd because a parlance does not entertain beliefs. I will consider *à en croire* as a preposition which accepts NP complements. It selects the type **human**, in which case we obtain an interpretation similar to (24), but also a type I will dub **extmanif**, for 'external manifestation'; **extmanif** applies to nouns like *ap-*

parence, allure, aspect ('appearance' 'aspect'), *habillement* ('clothing'), *comportement* ('behaviour'), *manières* ('manners'), but also to physical properties like *blondeur* (lit. 'blond–ness')[15] or emotional/psychological nouns like *méchanceté* ('wickedness') or *agacement* ('irritation').[16] The unity of the type does not come from the nouns themselves, which are quite diverse, but from the following common property: all these nouns can head subject NP's of verbs like *manifester, trahir* ('betray'), *dénoter, indiquer, être le signe de* ('to indicate'). In addition the manifestation must be a property of a living being. When we have a physical objet, another attitude–based preposition, *à en juger par* NP (lit. 'if one judges from' NP) is more appropriate. So, although we have *Ce temple manifeste le savoir–faire des romains* ('This temple indicates the competence of the Romans'), we have a contrast *A en [??]croire/juger par ce temple, les romains avaient un grand savoir–faire* ('In view of this temple, the Romans were very competent'). *A en croire is also possible* with nouns denoting informational objects (*théorie*, 'theory', *livre*, 'book', etc.).

Minute distinctions of this kind are anything but exceptional.[17] Consider the class of AV's which express a request or a requirement (*demander* ('ask (for)'), *exiger* ('require', 'demand') , *requérir* ('require'), *espérer* ('hope'), *souhaiter* ('wish'), *désirer* ('want', 'desire'). We have the following contrast.

(26)   a.   Dans cette affaire, j'espère/je demande/je [??]souhaite/je requiers /j'exige l'indulgence du tribunal

b.   Dans cette affaire, j'espère/etc. [??]la sévérité du tribunal
(lit. 'In this case, I ask for the leniency/strictness of the court')

Sévérité is possible with certain quantifiers (e.g. *un peu de sévérité*, 'a little strictness'). The contrast in (26) is not isolated since pairs like *bienveillance* ('benevolence') vs *humanité* ('humanity') or *attention* vs *concentration* pattern with *indulgence* vs *sévérité*. I conjecture that this difference reflects the fact that, in French, the unproblematic nouns denote primarily behaviors or attitudes of actors rather than properties of actions, actors, etc., as shown by the contrasts *??l'indulgence/la sévérité de sa décision* ('the leniencey/strictness of his reaction'), *??la bienveillance/l'humanité de cette décision* ('the benevolence/humanity of this decision'), *??l'attention/la concentration de son esprit* ('the attention/concentration of his mind'), *un acte d'indulgence/?? de sévérité* ('an act of leniency/stricness'), *une attitude de bienveillance/?? d'humanité* ('an attitude of benevolence/humanity'), *l'attention/?? la concentration est un comportement intéressant* ('attention/concentration is an interesting behavior'). For some reason, in certain constructions, verbs like *demander* require that their NP complements be headed by nouns which denote primarily actions. It is difficult to see how an explanation of this fact, whatever it is, might be based on the broad ontology of propositions, facts, events and the like.

4 Conclusion

In this paper I have suggested that the main weakness of the relational analysis of attitude verbs is not that it is relational but rather that it is based on a simplistic view of o.a. as direct semantic arguments of the predicate corresponding to the verb. I have proposed instead that o.a. are parts of complex informational structures, whose construction is in part lexically controlled. Further work is needed to determine the relation of this overtly lexical approach to recent elaborations of the standard ontological categories, such as proposition, fact or event (Asher 1993, Ginzburg & Sag 2000, Jayez & Godard 1999).

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