The notion of semantic roles is usually attributed to Fillmore [8], however its history can be traced back through Tesnière [16] to Panini. Following this tradition, many researchers recognize their usefulness in the description of language — even if they do not agree on their significance [7]. However, a weak or strong commitment to this notion does not elude the fact that it proves to be very difficult to settle on a finite set of labels along with their formal definitions. The dilemma resulting from this challenge is well known: to require a univocal identification by each role results in an increase in their number while to abstract their semantic content gives rise to an inconsistent set. If a finite set is possible, one has to find a proper balance between these two extremes. As a result, every flavor of roles have been used from time to time in linguistics (e.g., GB, in the spirit of Fillmore, HPSG, in the line of situation semantics), and also in AI [10, see also 4].

Between the total refusal to use those labels (as in GPSG) and the acceptance of individual roles (as in HPSG) there is a wide range of proposals on what constitute a good set of L(inguistic)-Roles [7] and, as a consequence, on the way to differentiate between them and define them. Most of the definitions have been based on the referential properties that can be associated with each role bearer (e.g. an AGENT is a volitional animate entity). Even if this approach is necessary at one time or another, this kind of definition inevitably leads to either the “let’s create another role” or the “let’s abstract its definition” syndromes. Properties are not always of the static kind though. Sometimes, dynamic properties are also used (e.g. an AGENT is the perceived instigator of the action).

Since one of the desired characteristic of a roles system is the power to discriminate events [5] (another “desired” property being to offer an easier selection of grammatical functions), the recognition of semantic roles should be linked to the interpretation of the event, that is to their dynamic properties. In a study on locative verbs in French, Boons [3] has convincingly shown the importance of taking into account aspectual criteria in the description of a process, suggesting that GOAL and SOURCE roles should be reinvestigated in the light of those criteria. It is our hypothesis that proliferation of roles is a natural phenomenon caused by the specialized properties required by the interpretation of a predicate within a specific semantic field: to overlook these properties yields the over-generalization already mentioned. The best way to approach the expansion/contraction dilemma is to search for the minimal relations required for a dynamic interpretation of events (in terms of their aspectual criteria and through an identification of all the participants in it).

Our first step toward this abstraction was to consider each participant (individuals or properties) either as a localized entity (a token) or a location (a place), and to determine its role in the realization of the process expressed by the predicate. The model exhibits some common points with a localist approach [1,11] since it recognizes (in an abstract sense) the importance of spatio-temporal “regions” in the process of individuation of events [14]. To express the change of localization (again in an abstract sense), the notion of transitions is used. The entire construction is inspired by Petri net theory [15]: a set S of places, a set T of transitions, a flow relation F: (S x T) -> (T x S) and markers are the categories used to define the structure of a process (and as a consequence of the events composing it).

For example, the dynamic representation of Max embarque la caisse sur le cargo [3] can be analyzed in two steps. First there is a transition from an initial state IS where the crate is not on the cargo boat to a final state FS where the crate is on the cargo boat. The final state can be expressed by the static passive, la caisse est embarquée sur le cargo, and is schematized in (2). One of the argument (cargo boat) is used as a localization while the other argument is used as a localized entity (crate), the THEME according to Gruber [9]. The initial state can be expressed (in this case) by the negation of the final state and is schematized in (1). The realization of the entire process is then represented by the firing of the net which can be illustrated by the snapshots (1) and (2).

1. IS:O-\rightarrow-O:FS 2. IS,O-\rightarrow-O:FS

To integrate the participation of “Max” in the model, we recognize the importance of
causality in the discrimination of events [13,14].
Since the cause is understood to be the first
entity responsible for the realization of events [6], the obvious schematization is (3).

3. \[ \square \rightarrow \square \rightarrow \square \rightarrow \square \rightarrow \square \]

It is possible that a recursive definition
(places and transitions) will be necessary to ex-
press "properly" the causation, the localization
of events and processes or the concept of dy-
namic states [2,14]. In that case, the schematiza-
tion could then be (4). But we can achieve the
same result through a proper type definition of
the transition expressing the cause: \[ (s \times t) \rightarrow (t \times ((s \times t) \rightarrow (t \times s))) \], where "s" is a place and "t", a
transition.

This approach to semantic roles determina-
tion is close to the one undertaken by Jackendoff
[12]. His identification of each role to a par-
ticular argument position in a conceptual relation is
given here by the way it participate to the firing
of the net. (It is our guess that most of the con-
ceptual relations used by Jackendoff can be
expressed within this model, giving to them an
operational interpretation.) The model has the
advantage to give an explicit and simple definition
of relations that do not have the same
semantic range (e.g. CAUSE vs FROM vs AT).

The analysis of locative processes using
abstract regions instead of the traditional roles is
better because it is, we think, the real basis of
those interpretations. Abstracting away referen-
tial properties gives the basic interactions ex-
pressed by the predicate. Specifying those
properties within a specific semantic field gives
rise to the set of roles we are used to (e.g. within
the spatial field, schematizations (1) and (2)
express SOURCE and GOAL roles).

With this model we were able to give an
operational description of the difference between
Max charge des briques dans le camion/Max
loads the truck with bricks. The
schematization take into account
which participant is responsible for each transition
firing and thus can lead us to the "final"
place. As a first approximation of these continu-
uous processes, (5) and (6) are proposed (the
direct contribution of the instrument is also
introduced). But recognition, as a participant of
the quantity of bricks in (5) and the capacity of
the truck in (6), results in the schematizations (7)
et (8) (both display a specialization of their
direct object in order to complete the semantic
interpretation).

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