A Frame-Based Approach to Connectives

This paper proposes an extended FrameNet (FN) approach for the description of connectives, and aims to clarify the meanings of connectives by scrutinizing the combinatorial patterns of semantic frames evoked by the two clauses conjoined with the connective. Our study is based on FrameNet (Ruppenhofer *et al.* 2006), which is in turn based on Frame Semantics (Fillmore 1982, Petruck 1996), in that the meanings of clauses are described in light of the semantic frames evoked by the participating lexical items, and the core data are either derived from the annotated sentences in FN or use dictionaries to supplement clauses that have yet to be annotated in FN. It is an extension and application of the FN framework to connectives that have not yet been fully described in the project.

Although there is much research on connectives, few scholars explicate the types of semantic entities that are actually conjoined by connectives. For instance, Mann and Thompson's (1986, 1988) Rhetorical Structure Theory (RST) defines the types of relations realized by connectives in the form of conceptual descriptions of the nucleus and the satellite, but it does not explicitly specify exactly what semantic entities are represented by each of the clauses.

Here we describe the meanings of connectives in terms of the two frames that each clause evokes, whose combinational patterns we call "**frame valences**." The types of frames evoked by *both* main and subordinate clauses are based on the descriptions in FN. Since connectives have not been the target of analysis in FN, the whole constituent of a subordinate clause is treated as a frame element (of the main clause) or as an extra-thematic element (cf. Ruppenhofer *et al.* 2006). In the proposed framework, by contrast, the frame evoked in the subordinate clauses is also considered and analyzed. For example, in (1), the Chatting and Waiting frames are evoked in the main and subordinate clauses respectively (Chatting (Fm)-Waiting (Fs)[1]):

1. [<interlocutors>They] sat chattingTgt1 [<depictive>together] **while** [<protagonist> Elizabeth] waitedTgt2 [<expected_event>for trade to pick up again].

To capture the global structure of meanings and functions of a connective, the frame valences are further generalized on the basis of the frame-to-frame relationships. Shown in Figure 1, Waiting is generalized as Activity since it inherits from Intentionally_act. The generalized **frame valence** of (1) is now: Activity<−pun>(Fm)-Activity<−pun>(Fs) with punctuality properties coded.

To inductively obtain the **frame valences** of *while*, we examined 50 core data mainly taken from FrameNet and dictionaries (*COB*5, *MED*, and *OALD*7). The analysis revealed 10 major **frame valences**, shown in Table 1. We demonstrate that laying out such frame valences is a useful method for differentiating between the four senses of *while*, and for clarifying the differences between *while* and its synonymous connective *although*. The list of frame valences obtained in this study has further been tested with the data (250 tokens) randomly drawn from the British National Corpus (BNC). Furthermore, the connective uses of *since* (from BNC) are also examined to show that this approach is applicable to other polysemous connectives.
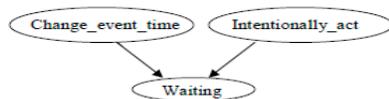
Meanings	No.	Fm	Fs
Simultaneity	i	Activity<−pun>	Activity<−pun>
	ii	State	Activity<−pun>
	iii	Activity<−pun>	State
Duration	iv	Activity<+pun>	State
	v	Activity<+pun>	Location
	vi	Activity<+pun>	Activity<−pun>
Contrast	vii	Change	Change
	viii	Attribute	Attribute
Concession	ix	Mental Attitude	Mental Attitude
	x	State	Mental Attitude

Figure 1 FrameGrapher depiction of frame-to-frame relationships. Table 1. The generalized frame valences of *while*

[1] Fm and Fs indicate "Frame in the Main clause" and "Frame in the Subordinate clause". Frame elements are indicated in angle brackets.

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