From Planning to Actions:
Realizing Intentions by Rhetorical Means

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1. Introduction

This essay describes experiences made in connection with the consultation system WISBER [Horacek et al. 1988] and with the explanation device DIAMOD [Horacek 1993a], featuring the role of intentions in the former and the role of rhetoric in the latter. Assessing the results obtained, we clarify our standpoint concerning the workshop topic, emphasizing on future prospects for text planning.

2. The role of intentions in discourse planning

In simulating a consultant's role, a central capability of WISBER is reasoning about the conversants' intentions to determine a communicative action that is likely to achieve progress towards a long-term consultation goal [Gerlach, Horacek 1989]. The mental model of the agents involved consists of BELIEFs, KNOWs, and WANTs, which are expressed as primitive, time-dependent states. An agent's INTENTION is defined as a WANT to achieve a state, including a BELIEF that performing a certain action will lead to that state. A rule-based mechanism is invoked to maintain consistency by updating the temporal validity of these mental states, to infer a communicative system goal, and to associate appropriate speech acts with that goal (this association is made more profound by a rule- based mechanism in Cohen and Levesque's style [Horacek 1991b]).

Evidence about relations between several WANTs derived from subsequent utterances is kept [Horacek, Gerlach 1990]. The contextual interpretation of these relations is done on the basis of CA-PABILITIES and COMPETENCES ascribed to the agents involved, augmented by the actual POS-SIBILITY to carry out the actions referred. This way, intentions are related via their contents (one is a PART of another, or one is the REASON for another). In a more elaborate model of consultation [Horacek 1990a], an agent's evaluations are expressed in terms of ESTIMATES and (derived) PREFERENCES. These assessments may refer to general and vague concepts introduced in the dialog context, which the consultant has to relate meaningfully to the concrete properties of the candidate domain objects.

The system typically produces one- or two-clause dialog contributions composed in a two-stage lexicalization process [Horacek 1990b] which respect the addressee's command of terminological knowledge and reflect simple stylistic preferences. Only when producing a recommendation, the surface realization structurally differs from the intentional representation, so that rhetorical aspects are really a concern. In this case, the consultant's intention comprises the identification of a recommendable object, and the description of a property considered most interesting for the advice-seeking person. The surface form consists of two separate sentences serving these purposes in the indicated order. Because of that order, interpretations that the property is meant to be restrictive or a motivation or justification for the choice made are excluded, and the fact that only one property is mentioned carries the message about its importance – the environment is cooperative, not mentioning other properties must be on purpose.

3. Applying rhetorical means to communicate more complex messages adequately

In producing explanations about an expert system's problem solving behavior, we concentrate our effort on generating logical explanations. For this issue, determination of semantic content proves to be a complex task, guided by finding and exploiting dominances and redundancies among potentially useful arguments [Horacek 1992b]. The resulting argumentative structure is converted into a text plan in a structure-preserving way [Horacek 1992a]. For instance, hierarchical relations are maintained so that an argumentative pattern consisting of a justification breaking down into sub-arguments is carried over to the text structure. For increasing readability, the text is augmented by an introductory statement about the structure of the message and by a summary. However, the motivation for the application of these measurements still has to be captured in a formal way.

Moreover, we have designed a mechanism that aims at exploiting the addressee's inference capability for avoiding (boring) redundancies, by anticipating his/her comprehension process in the generation task. This procedure is justified by the observation that (the relevance of) generic regularities can be inferred from referential facts and vice-versa, due to the expected relevance attributed to information conveyed in a cooperative, task-oriented environment. Assumptions about the addressee's acquaintance with domain knowledge have significant influence on anticipating his/her inferences. In addition, psychologically motivated principles (like maximal coverage and minimal complexity) guide preferences among possible interpretations [Horacek 1992c]. Hence, only some central pieces of information need to be said explicitly for getting the entire message across.

4. Future prospects for text planning

We think that these considerations provide sufficient evidence for the roles of intentions and rhetoric in discourse. Intentions drive internal goal-oriented reasoning about mental models of agents and manifest themselves in terms of plans adopted and actions carried out, independently of whether communication is involved or not. Intentions address envisioning physical or mental states related among each other in a way described in section 2. Rhetoric manifests itself in the differences between (representations of) mental states and the variety of surface forms used to satisfy the underlying goals by adequate presentations. These measurements include structuring and ordering pieces of text, applying rhetorical figures, and taking consequences of the Gricean maxims into account (for instance, conveying a piece of information or not is on purpose).

In our view, relations between rhetoric and intentions are described well in (classical) literary rhetoric

which, therefore, should also guide adequate formalizations. In that approach, intentions comprise a pure semantic content (the 'proprium') and an attitude holding towards it. The art of rhetoric is then to select forms that convey the intended attitude towards the 'proprium'. In computational approaches, on the contrary, semantic, intentional, and textual relations are frequently treated in a uniform way, subsumed under the term 'rhetorical relations', which makes organizating the text planning process less clear.

There are several prerequisites for orienting text planning on classical rhetoric. A basic and general vocabulary of semantic relations is needed (CAPABILITY, POSSIBILITY, COMPETENCE, and the associated state-transition model constitute a first step towards that goal). On the basis of these semantic relations, relations between intentions can be defined, including formalizations of aspects of cooperativity (a primary sketch can be found in [Horacek 1991b]). In our view, this approach also seems to be promising to develop formalizations for complex relations like SOLUTIONHOOD and CONCESSION, on the basis of the underlying facts and attitudes holding towards them. Moreover, the associated reasoning process has to reflect degrees of graduality which characterize several aspects in communication: an agent's assessments (e.g., ESTIMATE [Horacek 1990a]), his/her acquaintance with domain terms and concepts, and progress towards a long-term communicative goal. The quantitative aspect is missing in computational approaches.

When the employment of rhetorical figures is invoked to compose a text that is supposed to serve a communicative intention, the choices to make have to be oriented on anticipating the addressee's comprehension process in several respects:

- Making use of his/her inference capabilities, only parts of the information to convey need to be expressed explicitly (see [Horacek 1991a], [Horacek 1992c]).

- There is a trade-off between fluent expressions, which may entail ambiguities, and precise ones, which may occasionally sound awkward

- [Block, Horacek 1990] argue in favor of naturalness, if the resulting ambiguity is tolerable.

- Envisioning a reasonable degree of comprehension (see [Horacek 1993b]), the amount of information communicated should not exceed a certain quantity, among others; this goal would also yield motivations for the incorporation of purely textual relations like summaries and hints about the structure of a text.

We think that these arguments have identified a couple of problems in the area of intentionality and rhetoric, but also some promising ways towards solutions.

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