

# Knowledge, Intention, Rhetoric: Levels of Variation in Multilingual Instructions

Judy Delin\*

Donia Scott<sup>†</sup>

Tony Hartley<sup>‡</sup>

## Introduction

Instructional texts are designed by an Originator (O) to enable a User (U) to perform a task safely, efficiently, and correctly. The starting point for the construction of such a text is a set of underlying intentions relating to the actions that U is intended to perform. This needs to be expressed in the text in a grammatical and pragmatically effective way. Analysis of multilingual texts, however, indicates that what is pragmatically effective in one language may not be what is preferred in another. Our research has concentrated on the task of delineating which parts of the text production process are open to this sort of variation, and which parts follow directly from the task structure that is the shared representation for all the languages. The multilingual data has enabled us to tease out six levels of representation at which variability can and does arise. This makes the picture, for instruction generation at least, rather more complex than any simple mapping between task structure and discourse structure can hope to approximate.

What are the levels it is useful to distinguish? We suggest they are as follows:

**The knowledge of the artefact** A functional model of the artefact and its mode of operation in terms of actions and states;

**The deep intentions** The representation of the originator's intention that the user perform the sequence of actions that constitute a particular task involving the artefact;

**The knowledge selected for communication** What is to be communicated about the artefact and the task that will enable the users to perform the appropriate actions, based on assumptions about their cultural background, world knowledge, and expertise;

**The shallow intentions** A representation of the goals that the text has to achieve in order to motivate the required tasks;

**The rhetorical structure** The discourse strategy/ies chosen to achieve the text's goals; and

---

\*School of Cognitive and Computing Sciences, University of Sussex (email: judy@cogs.sussex.ac.uk)

<sup>†</sup>Information Technology Research Institute, University of Brighton (email: donia.scott@itri.bton.ac.uk)

<sup>‡</sup>The Language Centre, University of Brighton (email: aflh@vms.bton.ac.uk)

**The syntactic structure** The syntax expressing the chosen rhetorical structure.

We focus here on three of the above levels: deep intentions, shallow intentions and rhetorical structure, and we will present evidence from multilingual instructions that supports this differentiation of levels of description by highlighting the variability that exists between them. It is clear that, whatever the principles are for relating them, the mapping from one level to another is not a simple one-to-one correspondence. But why suggest two levels of intentions, and what are they like?

## Two Levels of Intentions

Every set of instructions is the realisation of a programme of actions that the user is required to perform: the **deep intentions** of the originator. In multilingual document generation, this programme is necessarily independent of the language(s) in which the instructions are expressed. Intentions at this level do not specify linguistic acts to be performed; rather, they are intentions for the user to perform concrete actions. Intentions at this level might therefore be represented as hierarchically-organised sequences of statements like *intends(O, do(U, action<sub>i</sub>))*.

This level of action requirements often does not map directly onto the final text, and may not even be expressed explicitly in it. It does not correspond to a text plan; rather, it is the action plan which motivates the text and as such is but one of several available resources for the text planner. For example, instructions which include all the actions required to achieve a goal, even those which the user reasonably could be expected to infer, are not usually desirable (see di Eugenio [1992]).

This level of intentions relates almost directly to that presented by Grosz and Sidner [1986:201] in their discussion of what they term the *action casc*. The main difference between our deep intentions and those that form Grosz and Sidner's *discourse purposes* (DPS) and *discourse segment purposes* (DSPS) is that we have so far found it sufficient for our purposes to include at this level only the originator's intentions with respect to user actions, and not user beliefs.

In producing instructions the originator also has other intentions, which relate to the way(s) in which he/she will convey the action requirements to the user. This leads us to propose a second level of intentionality, that of **shallow intentions**, where the particular functions to be fulfilled by the discourse are specified.

Consider the following simple scenario where the intention of the originator is for the user of an electronic organiser to turn on the machine by pressing the ON button. The deep intentions would thus be as follows:

- (1) *intends(O, do(U, turnonmachine))*  
*intends(O, do(U, pressONbutton))*

The intention for the user to turn on the machine is at a higher level in the intentional structure than the intention for the user to press the button (This might be captured, using Grosz and Sidner's terms, as a DOMINATES relation holding between the higher and lower intentions).

The originator of the instruction may feel that it is sufficient simply to instruct the user to turn on the machine, or to press the ON button. This would lead to a shallow intention corresponding to:

(2) *intends(O, inform(O, U, do(U, turnonmachine)))*

in the case of the former, and

(3) *intends(O, inform(O, U, do(U, pressONbutton)))*

The information that originators choose to convey in instructions, however, is not always this basic: users are not simply told what to do. Good instructions allow the user to develop a fuller understanding of what they are doing through the provision of information such as the relationship between the required actions and their expected effects. Deep intentions may thus lead to other possible shallow intentions such as the following:

(4) *intends(O, inform(O, U, why – to(pressONbutton)))*

(5) *intends(O, inform(O, U, how – to(turnonmachine)))*

The choice of final expression (including the choice of coherence relation) will bear a direct relation to choices at the level of shallow intentions, and not deep intention. In the following multilingual instructions (taken from an instruction manual for a home exercise stepping machine) the deep intention is the same: that the user balance the apparatus by turning the milled wheel. However, the shallow intentions chosen for the different languages are not the same: in the English and German versions, the user is told *how* to balance the apparatus, while the French user is told *why* the milled wheel needs to be turned. These differing shallow intentions directly constrain the choice of coherence relation: an analysis in terms of RST, for example, would lead us to assign ENABLEMENT to the German and English versions, but PURPOSE to the French:

(6) The apparatus can be balanced on uneven floors by turning the milled wheel.

(7) Durch Drehen der Rändelmutter kann das Gerät unebenen Bodenverhältnissen angeglichen werden.<sup>a</sup>

---

<sup>a</sup>By turning of the milled wheel can the apparatus (to) uneven floor conditions adapted become.

(8) Tourner l'écrou molleté pour adapter l'appareil aux inégalités du plancher. <sup>a</sup>

---

<sup>a</sup>Turn the milled wheel to adapt the apparatus to the unevenness of the floor.

Note, too, that there is more than one possible surface formulation of each coherence relation: the expression chosen by the originator in each of the above examples is but one of a range of possibilities\*.

Moore and Pollack [1992] propose the need for two levels of RST relations, one relating to intentions (e.g. EVIDENCE) and the other to information (e.g. CONDITION). Although this suggestion clearly takes us closer to a solution to the lack of delicacy in the characterisation of RST relations, we should be careful to agree on a useful nomenclature that does not itself permit new confusions to arise. We hope that the workshop will provide an opportunity for clarifying these issues.

---

\*It is also important to point out the similarity between this level of description and the type of information captured by the EFFECT field of rhetorical relations in RST

## Summary and Implications

We suggest these six levels of representation to reflect what we have observed in the analysis of multilingual instructions. At the basic level, parallel instructional texts are in some sense ‘the same’, in that they are intended to achieve the same effect—i.e., these texts are CONGRUENT at the level of deep intentions. However, this level alone is not sufficient to account for the observed variability between congruent texts. For example, we would expect the same rhetorical relation to be chosen in each language for a given deep intention, and as we have shown, this is not the case. What underpins the choice of rhetorical relation (among other pragmatic constraints) is the intermediate level of shallow intentions: the rhetorical goals selected for the actual text. Coherence relations are chosen to support these shallow intentions. The corollary of this is that any analysis of the coherence relations present in a text will not reveal the deep intentions underlying that text (its ‘message’, so to speak), since the levels of variability we have described here do not allow such a straightforward mapping.

The multilingual data prevents this assumption that the mappings between these levels are simple, since it shows how much variability there may be between one level of representation and the next for different languages. However, it should not be assumed that the six levels we propose are strictly serially ordered in terms of deciding how to present a text in a given language. As in any process related to language production, a decision at one level may be influenced by facts several levels above or below.

With respect to the translation of instructional texts, it seems clear to us that the interface between shallow intentions and discourse relations plays a critical role in determining the naturalness and appropriateness of the target text. It is highly likely that the nature of the variation occurring at this level is language-dependent, with the result that the decisions taken in the production of the source text may not be appropriate for the target. As far as we know, this level of representation is not exploited in current MT systems.

Our data suggest that capturing the variability between congruent texts is a rich area for investigation, and one that sheds light on the levels of intention and rhetoric that underpin discourse. We suggest that such a study not only points to advances in theory, but to advances in MT and M-NLG in the production of pragmatically appropriate instructional texts.

## References

- di Eugenio, B [1992] Understanding Natural Language Instructions: The Case of Purpose Clauses. Proceedings of the 30th Annual Meeting of the ACL, pp. 120–127.
- Grosz, B and Sidner, C [1986] Attention, Intentions, and the Structure of Discourse. *Computational Linguistics*, 12, 3.
- Moore, J and Pollack, M [1992] A problem for RST: the need for multi-level discourse analysis. *Computational Linguistics*, 18, 4.