

CHAPTER 3

Ideal and deviant interlocutors in a formal interpretation system

Gábor Alberti, Noémi Vadász and Judit Kleiber
University of Pécs, Hungary

Conversational partners' "ideal" information states – their knowledge (about the world and each other), their beliefs (with different degrees of certainty), their desires and intentions (of different degrees of intensity) – can be specified at any point in the conversation. The various elements making up an information state are sometimes standard-like, but often they serve as basis for various possible *deviations* from the standard. Some verbs which express particular deviations are discussed, including the extreme case of lying while saying the truth. Our analyses are presented in a *formal* interpretation system, which allows us to demonstrate how different meanings emerge while only changing polarity parameters from case to case. We thus intend to build a bridge between pragmatics and hardcore formal semantics.

1. Our formal discourse-semantic framework: *ReALIS*

The pragmatico-semantic analyses and DRS-style representations of different communication situations presented in this paper (see the formal definitions of Discourse Representation Structures in Kamp et al. (2011), and Asher and Lascarides (2003)) rely on a theory called *ReALIS* (*REciprocal And Lifelong Interpretation System*). *ReALIS* is a new "post-Montagovian" theory with an aim to formally interpret sentences which constitute coherent discourses. The theory is centered on a *lifelong* model of lexical, interpersonal and cultural/encyclopedic knowledge of interpreters, including their *reciprocal* knowledge about one another.

Those interested in a more detailed description of *ReALIS* are referred to the 40-page-long formal definition of the theory at <http://nyelvtud.btk.pte.hu/menu/39/29>. Various aspects and applications of the theory are demonstrated in further publications: see, for example, Alberti 2005; Alberti et al. 2010; Alberti and Károly 2012; Alberti and Kleiber 2012; Kleiber and Alberti, in press).

One aspect of the approach applied in *ReALIS* relevant to the present study is that it uses (huge) Kamp-style DRSs as *lifelong* representations of the interpreters' *information states*. Also, what serves as constructions playing the role of *possible worlds* in (post-) Montagovian discourse-semantic analyses are embedded DRS boxes here, which are, in practice, nothing else but finite information pools not closed under logical operations. Due to the boundless embedding of "boxes", we can express interpreters' beliefs / desires / intentions (BDI) about others' BDIs about other BDIs (about further BDIs... – in an endless recursion). Thus, an interpreter's information state is captured formally as a labeled tree system of "worldlets" (i.e. of finite information pools mentioned above); and it is to be construed as the description of the interpreter's mind or his/her "internal world" – part of the entire world model which also contains the external world.

ReALIS can be defined formally – by the means of *simultaneous recursion* – as an epistemic multi-agent system $\mathcal{R} = \langle W_o, W, \text{Dyn}, \text{Tru} \rangle$, where "agents" ('interpreters') obtain information about the world around them (including one another's minds). W_o denotes the external world and/or "a full history" (since it also contains a temporal dimension). Based on this, both *static* (truth-conditional) evaluation (*Tru*) and *dynamic* (DRS-constructing) *interpretation* (*Dyn*) can be carried out, in cooperation. W is a function where $W[i, t]$ is the information state (=internal world) of interpreter i at moment t . $W[i, t]$ is a labeled tree system of worldlets. The interpretation of *modal* expressions can be based on appropriately labeled worldlets, instead of the external world W (or any kind of "possible world").

What this in fact means is that there is no *intensionality* in *ReALIS* (as in the usual sense), since the interpreters' worldlets (inside the descriptions of their minds within the entire model of the universe) carry all sorts of information (BDI, guesswork, dream) which would typically be "entrusted to" possible worlds. In other words, interpretation is always *extensional*, with its basis either being W_o , or a sector of an interpreter's $W[i, t]$, or, quite frequently, some combination of the external world and different worldlets of several interpreters. The fundamental hypothesis behind this approach is that all (linguistic) problems which have been said to require "possible worlds" to be solved can actually be solved by means of worldlets.

2. Formalization

Below we represent our formalization through the example of an ideal communication situation.

Let us consider a simple assertion: *Mary is at home*. The ‘initial segment’ (Γ_s^0) of the ideal speaker’s information state encodes that he/she knows that eventuality e (Mary is at home) is true. In the formal approach of ReALIS this knowledge is represented as a “worldlet” (within the speaker’s mind) which contains e and has the following label:

$$(1) \langle \text{BEL}, \text{max}, s, \tau, + \rangle$$

where the first value is a modality parameter (*belief* in this case), and *max* shows the intensity of this modality (here, *certainty*). Thus, in the scale that contains such degrees of belief as suspecting, speculation, guess, we regard certain knowledge as an extreme case of belief. Symbol s stands for *speaker* (the (direct) host of the worldlet), τ is a time parameter, and $+$ is the value of polarity. Two further potential parameters, style and sentiment, are not discussed here.

The polarity parameter requires some explanation, as regards its distinguished role in our approach (see Table 1 in 3.1). Two of its four possible values, plus (+) and minus (−), essentially correspond to the two traditional truth values, ‘true’ and ‘false’. In our system, however, there are two further polarity values, ‘0’ and ‘ θ ’ (“crossed zero”). Thus we practically use the four-member powerset $\mathcal{P}(\{+, -\})$ of the two-member set of truth values. Zero refers to the lack of information. The role of crossed zero will be elucidated soon.¹

This segment can be described formally as follows:

$$(2) \Gamma_s^0 = \{ \langle \text{BEL}, \text{max}, s, \tau, + \rangle \}$$

The initial segment (Γ_i^0) of the ideal interpreter’s information state, shown in (3) below, reveals that he/she does not know if e is true (first row), and that he/she desires to acquire this information in the future: $\tau' > \tau$ (second row). Symbol θ refers to the fact that the interpreter’s desire pertains to the acquisition of neither the positive piece of information that Mary is at home nor the negative one, according to which Mary is not at home. The ideal interpreter is assumed to be interested in the acquisition of the truth.

1. In order to avoid potential misunderstandings about our formal account (of different sorts of lying), it should be noted that the four polarity values are not hypothesized to cooperate directly via a customary logical calculus, since many-valued logics are known to be very intricate systems because of general demands of logics (Ruzsa 2001). Rather, the domain of the cooperation of the polarity values extends to the entire system of the interlocutors’ information states in the global perspective offered by ReALIS (Alberti and Kleiber 2012). This perspective is not only global but also enables us to capture pragmatico-semantic problems in a “finite” way (to avoid problems of logics due to infinity). The polarity values, as parts of the complete system of such worldlet labels as the one demonstrated in (1) above, take part in the calculi of the truth-conditional interpretation of sentences (Károly and Alberti 2013).

$$(3) \quad \Gamma_i^0 = \{ \langle \text{BEL}, \text{max}, i, \tau, 0 \rangle, \langle \text{DES}, \text{great}, i, \tau, + \rangle \langle \text{BEL}, \text{max}, i, \tau', \theta \rangle \}$$

On the next level of representation, the interlocutors' information states contain assumptions about their conversation partner's internal world. The speaker intends to let the interpreter know that e is true, and also, he/she has a (somewhat less certain) belief about the hearer's initial information state. He/she assumes, for instance, that the hearer does want to know if e is true or false.

$$(4) \quad \Gamma_s^1 = \{ \langle \text{INT}, \text{great}, s, \tau, + \rangle \langle \text{BEL}, \text{max}, i, \tau', + \rangle \} \cup \{ \langle \text{BEL}, \text{great}, s, \tau, + \rangle \} \wedge \Gamma_i^0$$

Similarly, the interpreter assumes that his/her partner is an ideal speaker:

$$(5) \quad \Gamma_i^1 = \{ \langle \text{BEL}, \text{great}, i, \tau, + \rangle \} \wedge (\Gamma_s^1 \cup \Gamma_s^0)$$

Generally, the n^{th} level of representation can be calculated on the basis of these formulas via simultaneous recursion:

$$(6) \quad \begin{aligned} \Gamma_s^n &= \{ \langle \text{BEL}, 1/(n+1), s, \tau, + \rangle \} \wedge \Gamma_i^{n-1}; \\ \Gamma_i^n &= \{ \langle \text{BEL}, 1/(n+1), i, \tau, + \rangle \} \wedge \Gamma_s^{n-1} \end{aligned}$$

The intensity (level of certainty) of these beliefs correlates with the depth of the recursion ($1/(n+1)$). In actual conversations, the case where $n > 2$ rarely occurs; however, if required, any depth can be evoked because, in theory, unlimited depths can be represented ("I know that you know that I know..."). Some "laziness principle" keeps the number of worldlets to a necessary minimum. An infinite union of these sets constitutes the interlocutors' potential entire information states:

$$(7) \quad \begin{aligned} \Gamma_s &= \bigcup \Gamma_s^n \quad (n = 0, 1, 2, \dots) \\ \Gamma_i &= \bigcup \Gamma_i^n \quad (n = 0, 1, 2, \dots) \end{aligned}$$

Section 3 is devoted to proving that this system of formalization is readily suitable for handling any sort of non-ideal communication situation. The only thing that needs to be done is to replace certain (generalized) polarity values (+, -, 0 or θ) with other values in the formulae under (1)–(6) that define the ideal information states in (7).

3. Communication situations

Although the concept of an 'ideal communication situation' is widely used in pragmatics, it is very difficult to pinpoint. For a communication situation to be ideal, it takes ideal partners (a hearer and a speaker) and ideal circumstances.

In the present paper, the meaning of 'ideal' shall be extended beyond the Gricean (1975) sense. 'Ideal' here means some kind of smoothness when nothing

disturbs the smooth flow of conversation. Course books and foreign language books, for example, typically feature ideal speech situations to illustrate humorless but easy-to-process discourse. The reason why it is crucial to mark off the case of an ideal communication situation is because all other (deviant) cases can be then correlated to it; this, then, makes it possible to allocate all the different situations in one system. Grice's theory and maxims come handy when one wants to demonstrate what the ideal situation is like, since they provide a good enough definition for the "obligations" of the speaker who does not wish to upset the flow of this more or less humorless conversation in any way.

Earlier it has been said that the conversational parties aim to keep to a common goal. Now this may be misleading in that form: it may well be that it takes a certain degree of non-ideality for human conversations to be diverse in nature. It can be well presumed that most of the conversations one encounters day by day do not conform to the genuinely, *per definition* ideal standard. Also, most of the ideal communication situations are to be found in formal contexts (which are not devoid of misunderstandings, either). When one is talking to his/her immediate friends, he/she economizes on very little information to save time for both parties – almost to an extent of breaching Grice's maxim of quantity. Very probably, many of us have had the feeling of hardly being capable to provide answers to our partners that would be long and detailed enough. Oftentimes, we may have the feeling of only being capable of hurling fragments of information on the other one (while breaking the maxim of manner) in the hope that every situation becomes clear at some point. Again, our answers to certain questions may not satisfy the needs of the questioner at all; we use them in order to dissuade the questioner from further questioning (e.g. "What did you have for lunch at school?" "A first and a second course.").

Yet, every discourse features the common goal above somehow – except that in most of them this goal is not reached in a straightforward way. It has been mentioned earlier that the concept of an ideal speaker and hearer is necessary to allocate ideal and various non-ideal situations in one system. Although it is a daring idea to divide all communication situations into ideal and non-ideal, this is a necessary step to take here. Cases on the vague borderline between the two types of situations will not be addressed here; 'ideal' in this paper shall refer to a speaker and a hearer as they were specified above, while all other behavior of the speaker and the hearer shall be perceived as 'non-ideal'. Here we focus on cases where the speaker improperly or poorly identifies the desires of his/her conversational partner and where he/she misleads his/her partner on purpose. In addition, we will also attempt to account for the mistakes on the part of the hearer.

3.1 "Deviant" communication

Table 1 below represents a few possible deviations from the ideal case from the speaker's point of view, which can be captured by changing the value of one or more polarity parameters in the above-discussed formulae (1)–(7).

The situations, after receiving a formal description, are arranged in the order of their "seriousness". The table reveals how the different situations can be distinguished on a strictly formal base, by considering the changes to the polarities of the various wordlet-polarity-labels, as is reviewed in (8) below. All twelve situations represented in the table have diverse meanings; we, however, operate with the prime or preferred meaning, primarily relying on our mother-tongue intuitions.

- (8.1) The speaker's knowledge of *e*:

$\langle \text{BEL}, \text{max}, s, \tau, \pi^1 \rangle$

(cf. $\langle \text{BEL}, \text{max}, s, \tau, + \rangle$ in (1) and (2))

- (8.2) The speaker's assumption on the hearer's knowledge of *e*:

$[\langle \text{BEL}, \text{great}, s, \tau, \pi^2 \rangle \langle \text{BEL}, \text{max}, i, \tau, \pi^3 \rangle]$

(cf. $[\langle \text{BEL}, \text{great}, s, \tau, + \rangle \langle \text{BEL}, \text{max}, i, \tau, 0 \rangle]$ in (3)–(4))

- (8.3) The speaker's assumption on the hearer's desire pertaining to *e*:

$[\langle \text{BEL}, \text{great}, s, \tau, \pi^4 \rangle \langle \text{DES}, \text{great}, i, \tau, \pi^5 \rangle \langle \text{BEL}, \text{max}, i, \tau', \pi^6 \rangle]$

(cf. $[\langle \text{BEL}, \text{great}, s, \tau, + \rangle \langle \text{DES}, \text{great}, i, \tau, + \rangle \langle \text{BEL}, \text{max}, i, \tau', \theta \rangle]$ in (3)–(4))

Table 1. Polarity values in the description of communication situations

π^1	π^2	π^3	π^4	π^5	π^6	π^7	π^8	SITUATION
+	+	0	+	+	θ	+	+	CLEAR/PURE/IDEAL
+	+	+	+	0	θ	+	+	CLARIFICATION
+	+	–	+	0	θ	+	+	CORRECTION
+	+	0	+	+	θ	–	θ	BLAB OUT (CONCEALMENT)
+	+	0	+	–	τ'	θ	+	KILLING THE JOKE
			+	+	τ''	θ		
c1	+	+	0	+	θ	–	θ	FUDGE
c2	+			0		0	θ	
0	+	0	+	+	θ	+	+	BLUFF
–	+	0	+	0	θ	–	+	FIB
–	+		+	+	+	+	+	PIOUS/WHITE LIE
–	+	0	+	+	θ	+	+	SHEER LIE

- (8.4) The speaker's intension pertaining to the hearer's knowledge of e :
 $\langle \text{INT}, \text{great}, s, \tau, \pi^7 \rangle, \langle \text{BEL}, \text{max}, i, \tau', \pi^8 \rangle$
 (cf. $\langle \text{INT}, \text{great}, s, \tau, + \rangle, \langle \text{BEL}, \text{max}, i, \tau', + \rangle$) in (4))

These examples only serve as illustrations; changing other parameters, or considering changes beyond "isolated" assertions, or taking the interpreter's perspective into account (changing *his/her* polarity parameters) could yield several further instances (*withhold, mislead, misunderstand, elicit, waffle, pious lie* etc.).

3.2 The ideal situation of communication

Above, a clearly ideal situation was described. In view of the success of communication, however, other situations can also be considered as ideal. Take clarification or correction, for example.

In these two situations neither misleading, nor lying takes place as far as the speaker is concerned. Nevertheless, by changing the variables of the polarities, interesting situations can be illustrated where, for instance, the speaker corrects the hearer or clarifies information shared by both of them.

3.2.1 Clarification

Suppose the hearer and the speaker have the same information, but the speaker finds it important to clarify this fact (to avoid latter misunderstandings). Clarification does not only perform the act of stating that the speaker thinks the same about something. It usually also introduces a new topic to the discourse since the speaker likes to identify the parties' common knowledge about something to keep the conversation going (they tune in on each other, so that both of them will know what they are talking about).

By marking the difference from the ideal way, the "idealness" of the discourse can be recovered in the sense that no possibility for misunderstanding may arise. Such expressions as 'so' or 'OK, so' or 'thus' should be added to the expression of the shared piece of knowledge: e.g., "OK, so Mary is at home. We ought to visit her."

As for technical details, what is crucial is that $\pi^3 = +$ in (9.2) (instead of 0): the speaker is aware of the fact that he/she serves with no new information. He/she also knows that the hearer is waiting for no information pertaining to the given topic; hence, $\pi^5 = 0$ in (9.3):

- (9.1) $\langle \text{BEL}, \text{max}, s, \tau, + \rangle$
 (9.2) $\langle \text{BEL}, \text{great}, s, \tau, + \rangle \langle \text{BEL}, \text{max}, i, \tau, + \rangle$
 (9.3) $\langle \text{BEL}, \text{great}, s, \tau, + \rangle \langle \text{DES}, \text{great}, i, \tau, 0 \rangle \langle \text{BEL}, \text{max}, i, \tau', \theta \rangle$
 (9.4) $\langle \text{INT}, \text{great}, s, \tau, + \rangle, \langle \text{BEL}, \text{max}, i, \tau', + \rangle$

3.2.2 Correction

Making a correction is in many respects similar to clarification. In correction, the speaker corrects the false information which the hearer is supposed to have ($\pi^3 = -$ in Table 1 above in 3.1). This situation can be made ideal if the hearer assumes that the speaker is a reliable source of information, and if he/she accepts the correction. As an indication of this attitude, the hearer should use the words "yes, indeed". Here, the speaker is sure of his/her being right, and he/she intends to convince the hearer ($\pi^8 = +$ in Table 1).

3.3 Blabbing out

The non-ideal communication situation of blabbing something out involves an unintentional mistake made by the speaker. The speaker does not want the hearer to obtain some piece of information (see the corresponding row of Table 1 again):

- (10) [(INT, great, s, τ , -), (BEL, max, i, τ' , θ)] (cf. (4) and (8.4))

In all the instances reviewed so far, the particular pieces of information were assumed to be performed by the (person mentioned as the) speaker (him/her being the one to provide the information in question), and this speaker's information states were studied. Blabbing out is a part of performance the (somewhat idealized²) definition of which can be based upon the polarity values given in Table 1, which are assumed to be set in this way in the speaker's information state. It is worth noting that *concealment* can be characterized by the same set of polarity values in the speaker's information state. The only difference lies with the "physical reality" of the conversation: the speaker's success in this latter case is due to not saying something, which is different from the case where the speaker fails to withhold some information he/she originally wished to hide but accidentally blabbed out.

3.4 Killing the joke

Killing the joke is in fact blabbing out on purpose.

Here, the speaker provides the hearer with information that he/she did not want to know, at least not now. When one is reading a thriller or a crime story, for instance, he/she is anxious to find out, say, who killed the victim, but they would surely get angry if given this information too much in advance. Giving such

2. According to the second author, blabbing out can be realized in ways which can be described with the help of other values of π^4 , π^5 and π^6 .

information away before the end of the story would make the reading of the book pointless and would take the thrill and the fun away from the reader. In sum, in the situation of killing the joke, the hearer desires some particular information but gets it either at the wrong time or from the wrong source.

As for technical details, the formula in (8.3) should be specified twice, by applying it to an earlier moment τ' and to a later one τ'' . The latter case, shown in (11.1) below, coincides with the ideal case of communication: the hearer is assumed to be longing to learn the truth. What (11.2) expresses, is an unusual element of the communication situation: the hearer does not want to learn the truth *so early on*:

- (11) Cf. (8.3), where τ'' is a later point of time than τ' , which is later than τ :
 (11.1) [$\langle \text{BEL, great, s, } \tau, + \rangle \langle \text{DES, great, i, } \tau, + \rangle \langle \text{BEL, max, i, } \tau'', \theta \rangle$]
 (11.2) [$\langle \text{BEL, great, s, } \tau, + \rangle \langle \text{DES, great, i, } \tau, - \rangle \langle \text{BEL, max, i, } \tau', \theta \rangle$]

3.5 Fudge

Fudging – when the speaker *talks the hearer's head off* and thus violates the Gricean maxims of quantity and relevance – is a type of concealment.

The speaker only gives true information, hence no lying takes place, but the hearer will not receive the piece of information that the speaker assumes to be relevant to him/her.

The formalization of fudging requires reference to two kinds of information: one being the kind of information that the hearer seems to require but will not receive from the speaker (see the label descriptions in (12)), and the other being the information that serves the purpose of distracting the hearer's attention (13):

- (12) Cf. (8.3–4): e_1 is a piece of information the hearer is assumed to need:
 (12.1) [$\langle \text{BEL, great, s, } \tau, + \rangle \langle \text{DES, great, i, } \tau, + \rangle \langle \text{BEL, max, i, } \tau', \theta \rangle$]
 (12.2) [$\langle \text{INT, great, s, } \tau, - \rangle, \langle \text{BEL, max, i, } \tau', \theta \rangle$]
 (13) Cf. (8.3–4): e_2 is a piece of information that the speaker provides instead of e_1 :
 (13.1) [$\langle \text{BEL, great, s, } \tau, + \rangle \langle \text{DES, great, i, } \tau, 0 \rangle \langle \text{BEL, max, i, } \tau', \theta \rangle$]
 (13.2) [$\langle \text{INT, great, s, } \tau, 0 \rangle, \langle \text{BEL, max, i, } \tau', \theta \rangle$]

Suppose, for instance, Mary is mentioned in a conversation. One of the interlocutors knows that Mary, who studies in the States, has returned for a short break to spend in Hungary, but does not want the other participants of the conversation to learn this – even though he/she is aware of the fact that they would be glad at hearing about Mary being at home. The speaker thus conceals this information. Being afraid of getting a question about the topic, he/she starts telling long stories

about Mary's adventures in the States, which he/she then follows up with other people's stories in the States, only in order to distract the others' attention.

3.6 Bluff

Bluff is a form of misleading since the speaker violates the Gricean maxim of quality, but it is still not a lie in the classical meaning of the word.

In the simplest case of bluffing,³ the speaker, to fulfill his/her (ill) purposes, provides the hearer with information the truth of which he/she is not confident about. Hence, $\pi^1 = 0$ in Table 1 above in 3.1, instead of +, while other values are all equal to those in the description of the ideal communication:

(14.1) $\langle \text{BEL}, \text{max}, \text{s}, \tau, 0 \rangle$ (cf. (8.1))

It is straightforward, nevertheless, to raise the question *What is the speaker's purpose with this?* Why does he/she want to make the hearer believe a particular thing is true (14.2)?

(14.2) $[\langle \text{INT}, \text{great}, \text{s}, \tau, + \rangle, \langle \text{BEL}, \text{max}, \text{i}, \tau', + \rangle]$ (cf. (8.4))

(14.3) $[\langle \text{BEL}, \text{great}, \text{s}, \tau, + \rangle \langle \text{DES}, \text{great}, \text{i}, \tau, 0 \rangle \langle \text{BEL}, \text{max}, \text{i}, \tau', + \rangle]$ (cf. (8.3))

A potential explanation may be that the hearer intends to be pious by saying that the particular thing is true because he/she thinks that the hearer longs for this knowledge ($\pi^6 = +$ in (14.3)) instead of the (unknown) truth ($\pi^6 = \theta$).

3.7 Lies

Ethically considered, a misleading lie is a most serious misdemeanor.

In our formal approach, (direct) lies can be captured simply by specifying the formula in (8.1) as follows:

(15) $\langle \text{BEL}, \text{max}, \text{s}, \tau, - \rangle$ (cf. (8.1))

Here only the polarity parameter π^1 is considered. Lying, however, has different grades in respect of seriousness and can serve different purposes. These differences can also be captured by modifying the last seven parameters (π^2 – π^8 in Table 1). Some variants will be discussed in what follows.

3. Other meanings of bluff (e.g., bluff in poker) will not be discussed in this paper.

3.7.1 *Fib*

Telling stories or fibbing can be considered as a form of lying because the speaker provides the hearer with information about which he/she is convinced as not being true.

The difference between a fib and a lie is hard to tell. It is not only the level of seriousness that makes a distinction between them. In the case of risk-free fibbing, the speaker assumes that the hearer does not need the information at all (16.1), and this lends fibbing a risk-free nature: the speaker hopes that the hearer will not keep the misinformation to himself/herself (16.2). For example, a husband can tell his wife on a given day that he has paid the bills and not take any serious risks; he can easily pay the cheques the following day and straighten out the petty lie that way. Here, the fibber is not driven by anything bad; he only wants to protect his face.

(16) Cf. (8.3–4):

(16.1) [$\langle \text{BEL, great, s, } \tau, + \rangle \langle \text{DES, great, i, } \tau, 0 \rangle \langle \text{BEL, max, i, } \tau', \theta \rangle$]

(16.2) [$\langle \text{INT, great, s, } \tau, - \rangle, \langle \text{BEL, max, i, } \tau', + \rangle$]

The success of fibbing depends on a factor beyond the speaker's control: the fib must not be detected immediately. Let us continue our story about the fibbing husband with the reaction of his wife to her husband's remark: "Thanks, dear. You do know, don't you, that today was the last day to pay those bills." If the husband says nothing, he becomes a liar, because the piece of information in question has now proved to be relevant, contrary to his assumption (cf. (16.1)).

3.7.2 *Pious lie, white lie, adulation etc.*

The common feature shared by a large group of lies – the separation of which lies from one another is quite hard – is that the speaker "maps" the hearer's desire for e (17.1) and tries to satisfy this expectation (17.2), rather than observe the maxim of quality and not lie (by defining $\pi^8 = -$):

(17) Cf. (8.3–4) and (16.1–2):

(17.1) [$\langle \text{BEL, great, s, } \tau, + \rangle \langle \text{DES, great, i, } \tau, + \rangle \langle \text{BEL, max, i, } \tau', + \rangle$]

(17.2) [$\langle \text{INT, great, s, } \tau, + \rangle, \langle \text{BEL, max, i, } \tau', + \rangle$]

A doctor–patient situation may come to mind here: the doctor, thinking that he would make his cancer patient's last months better, may corroborate the patient's hopes with the pious lie that he/she is actually quite all right and will soon recover (see $\pi^3 = +$ in the corresponding row of Table 1 in 3.1). An insincere applause is a white lie, as well (here π^3 seems to be able to take all the three polarity values $+$, $-$ and 0). This latter lie, contrary to the former case, is likely to serve the speaker's purposes. Capturing this difference, however, would require the consideration

of deeper segments of the interlocutors' information states. Typically, when an insincere applause serves the purpose of corroborating the hearer's weak self-confidence, π^3 takes – as its value.

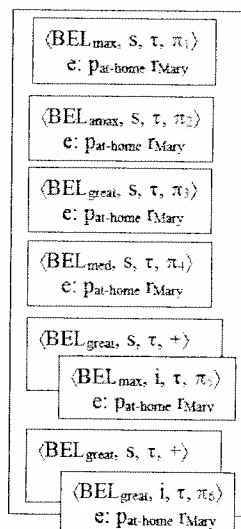
3.7.3 *Sheer lie*

In our somewhat idealized approach demonstrated in Table 1 in 3.1, a sheer lie can be considered to be in stark contrast to the ideal communication situation in that parameter π^1 is given the opposite polarity value (see (15) above) while the other parameters take the same values as in an ideal situation. This expresses that the speaker would readily have a chance to behave as an ideal speaker in an ideal conversation (who assumes himself/herself to be in the position to provide the hearer with the relevant information; see (8.2–3) in 3.1 and (3)–(4) in Section 2), but he/she abuses the trust and his/her power – while there are no attenuating circumstances (cf. 3.7.1–2).

4. Sentences with adverbs or auxiliaries of certainty

In Section 2 we intended to capture the information state of the speaker who performs a declarative sentence. The internal structure of the sentence was not taken into account. If it is considered, however, then it is to be regarded as a special case when the sentence contains some grammatical element pertaining to the uncertain status of a piece of information.

Table 2. Mary is quite likely to be at home



In assertions like *Mary [is very likely to be] / [is likely to be] / [may be] / [might be] at home*, for instance, the complete potential information states Γ_s and Γ_i of the interlocutors can be calculated in a similar fashion as in the method discussed in the previous sections (see (7)); certain polarity values, however, must be different. We are going to sketch the differences.

The evaluation below, for instance, shows the polarity values of the ideal speaker based on his/her information state, as it is represented above for the sentence *Mary is quite likely to be at home*:

$$(18) \quad \pi_1 = \pi_2 = \pi_3 = 0; \pi_4 = +; \pi_5 = \pi_6 = 0$$

The evaluation $\pi_1 = +$ here would mean that the speaker who is absolutely sure that Mary is at home wants to *withhold* some information concerning his/her knowledge about the situation or his/her "involvement" in it, and chooses to *mislead* his/her partner. Hence, the ideal value of π_1 is zero. π_2 or $\pi_3 = +$ would also mean that the hearer is slightly misled about the speaker's certainty about Mary's being at home, which is, in fact, 'almost maximum' or 'great'. The speaker's alleged 'medium' level of certainty (*quite likely*) should be in accordance with his/her factual certainty ($\pi_4 = +$). As for the speaker's ideal hypothesis about his/her partner, the neutral value of the last two polarity parameters guarantees *relevance*: the speaker is to provide some novel piece of information.

5. Lying while saying the truth

Meibauer (2005) argues that it is possible to lie while saying the truth at the same time. This section shows how to capture cases like this in the framework of ReALIS sketched in (8) and Table 1 above in 3.1.

Let us consider a case brought up by Meibauer (2005) as a classical case of 'lying while saying the truth' (cf. Posner 1980):

(19) The Story of the Mate and the Captain:

A captain and his mate have been having a long-lasting quarrel. The mate drinks more rum than is good for him, and the captain is determined not to tolerate this behavior any longer. When the mate is drunk again, the captain writes into the logbook: Today, 11th October, the mate is drunk. When the mate reads this entry during his next watch, he first gets angry, then, after a short moment of reflection, he writes into the logbook: Today, 14th October, the captain is not drunk.

We follow Meibauer's interpretation (2005) which is based on the claim that the point is that the mate's logbook entry is true.⁴ It is indeed the case that the captain is not drunk. However, what the reader will also get is that this is an exception, because the captain is usually drunk most of the time.

Meibauer's (2005) solution rests upon the calculation of the implicature, which comes from assuming a presumptive violation of the Maxim of Relevance, for entries in logbooks must be relevant. Let us consider how the concept of implicature can be handled in *ReALIS*.

Remember that a decisive property of *ReALIS* is its lifelong character: every agent is assumed to be building a gigantic DRS (discourse representation structure) in his/her life. Hence, an information state at each moment is a huge DRS, which can also be regarded as an extremely rich network of pieces of information. In this network predicates (and larger chunks of information) are linked to each other through referents which they "share" in a straightforwardly definable sense,⁵ and this linkage is suitable for relying on it a mathematical definition of "neighborhood"/"distance" among predicates.

Thus, the formal solution to (19) can be based upon the application of the scheme under (8) in 3.1 to (at least) two pieces of information: the original one *e* expressing that the captain is sober on the given day, and to an eventuality *e'* expressing that the captain is an alcoholic, which can be invoked due to the network discussed above. Further pieces of information are also relevant – and can also be invoked: for example, that someone responsible for a ship must not be drunk, and that it is primarily the captain who is responsible for the ship. On the other hand, however, sailors are known to like rum, which is an alcoholic drink, etc.

(20.1) $\langle \text{BEL}, \text{max}, s, \tau, + \rangle$: this label belongs to *e* ("the captain is sober")

(20.2) $[\langle \text{BEL}, \text{great}, s, \tau, + \rangle \langle \text{BEL}, \text{max}, i, \tau, + \rangle]$: this also belongs to *e*

(20.2') $[\langle \text{BEL}, \text{great}, s, \tau, + \rangle \langle \text{BEL}, \text{max}, i, \tau, 0 \rangle]$: this belongs to *e'* in the implicature of *e* ("the captain is an alcoholic")

(20.3') $[\langle \text{BEL}, \text{great}, s, \tau, + \rangle \langle \text{DES}, \text{great}, i, \tau, + \rangle \langle \text{BEL}, \text{max}, i, \tau', \theta \rangle]$: *e'*

(20.4') $[\langle \text{INT}, \text{great}, s, \tau, + \rangle, \langle \text{BEL}, \text{max}, i, \tau', + \rangle]$: *e'*

4. We do not (necessarily) follow the author in insisting on calling cases like this lies; but it is not worth entering into a terminological debate here. Instead, we concentrate on proving that our formal apparatus readily accounts for this type of deception, too.

5. Suppose the story of a marriage has been represented in a DRS in someone's information state. Then this DRS serves as a network where such predicates have entered into relations with each other as *marry*, (*be a*) *fiancé*, *fiancée*, *husband*, *wife*, *best man*, *bridal night*, *beget*, *go on their honeymoon*, *mother in-law* etc. Similarly, other stories generate a network among such predicates as *ship*, *captain*, *responsible for*, *mate*, *logbook*, *rum*, *drink*, *drunk*, *sober*, *alcoholic* etc.

The formula in (20.1) expresses that the mate tells the truth by saying *e*. As captains must be or can normally be assumed to be sober (at least, these days they are expected to be so), the assumption about the knowledge of the potential reader (20.2) does not fit the ideal case of communication (3.1). The pattern here coincides with the pattern of clarification (3.2), but that interpretation is excluded for (at least) two reasons. Clarification should be an operation in a real conversation, but a reader of the logbook cannot be regarded as a participant of a conversation. Also, clarification requires some explicit linguistic cue (3.2).

At this point, the reader should invoke some eventuality from the implicature, which would make the communication “ideal” by enabling the reader to consider this eventuality relevant. The crucial technical detail is that $\pi^3 = 0$ in (20.2'), which expresses that the captain's alcoholism an issue to address. The introduction of *e'* has also made the third condition “ideal”: (20.3') rests upon the assumption that the potential reader is eager to learn whether the captain is an alcoholic, or not.

Therefore, by (20.2' & 3'), the mate gets closer⁶ to his purpose, as formulated in (20.4'), in making the reader of the logbook believe that the captain is an alcoholic.

In general, we claim that the “mechanism” shown in example (20) above can be applied to all cases of “lying while saying the truth” discussed by Meibauer (2005).

We conclude with two topics raised by Meibauer (2005, 1395). He argues that *tautology* and *irony* also have to do with conversational implicature, and, consequently, they are suitable for “lying while saying the truth”.

As for tautology, we agree with Meibauer. *Bachelors are bachelors*, for instance, can be performed by someone who is telling an indirect lie by using this tautology while he/she does not agree with its content in spite of the fact that he/she has performed it. How is this possible?

The first occurrence of the noun in question refers to a group of people while the second occurrence serves as a predicate, which has an implicature. This implicature may contain the property – as shared knowledge in the speaker's community – that bachelors, say, do not wash their socks for months. If the speaker does not believe that a bachelor is indeed such that he does not wash his socks and still performs the given tautology, then he/she tells a lie.

6. We do not think that the mate can *reach* his ultimate aim (20.4') by means of the discussed type of indirect lie. What he is likely to reach is a less ambitious aim which can be formulated as the following variant of (20.4'): $\{\langle \text{INT}, \text{great}, s, \tau, + \rangle, \langle \text{BEL}, \text{max}, i, \tau', 0 \rangle\}$. According to this formula, the potential reader no longer thinks that the given captain is a prototypical (contemporary) captain who would never get drunk while in charge of his ship, but he/she is in doubts about the captain not being an alcoholic.

The technical details of our solution coincides with those of our proposal in the case of the Story of the Mate and the Captain (20): due to the lifelong character of ReALIS, it is possible to capture the fact that the original tautology e is replaced in the intricate mental network with a contingent piece e^* of information (concerning dirty socks, for instance).

As for irony, we cannot accept Meibauer's (2005) proposal saying that some kind of implication e' is triggered by eventuality e which coincides with the negation of e' . This is because in none of the earlier cases presented in this paper e and e' are – as they are used in (20) above – incompatible. In the story under (19), for instance, it was not incompatible for the captain to be sober on a certain day while otherwise being an alcoholic.

Let us consider Meibauer's (2005) example: speaker A utters *X is a fine friend*, referring to a person who has given away a secret of A's to a business rival. A obviously no longer considers X as one of his/her friends. "X is a fine friend" and "X is not a fine friend" are trivially incompatible.

We argue that irony, at least the particular kind of irony discussed in Meibauer's (2005) paper, can easily be accounted for if approached from a different direction. Let us consider the three labels below:

(21.1) $\langle \text{BEL}, \text{max}, s, t, + \rangle$

(21.2) $\langle \text{BEL}, \text{max}, s, t, 0 \rangle$

(21.3) $\langle \text{BEL}, \text{max}, s, t, - \rangle$

Label (21.1) is the crucial part of the formal description of the performance of a declarative sentence in an ideal communication situation (see (2)–(3) above): the speaker utters what he/she really thinks. Label (21.2) is the crucial part of the description of the performance of a question, also in an ideal situation: the speaker raises a question because he/she does not know the answer to it. Label (21.3) is the third choice as far as the polarity parameter is concerned: and languages do use this alternative, as well: this is the label that can capture (a basic kind of) irony, "the replacement of an expression that is meant by its opposite" (as is formulated in the *Routledge Dictionary of Language and Linguistics*, Bussmann 1996).

In this approach, thus, hearers are assumed to distinguish declarative, interrogative and ironical sentences from each other primarily relying on such formal cues as intonational patterns, word order, and particular morphemes. It is then a second step to specify the pattern as shown in (7) and (8) (see also (22) below) – solely based on this decision. Meibauer (2005, 1394) himself mentions that irony can be recognized based on characteristic intonation. And if the intonation does not help the reader/listener to determine whether a particular sentence has been performed ironically or not, he/she still make a decision using his/her earlier knowledge.

It is a natural possibility in this approach that the speaker, while seemingly behaving as if he/she was using the ironical pattern based on (21.3), has actually chosen a deviant variant (see Section 3). We are practically arguing for a homogeneous hypothesis according to which all the three patterns (21.1–3) can have deviant variants. Meibauer (2005, 1394) himself provides an example where *e* is ultimately true as a result of the combination of irony and lying:

- (21.3') A crashes into a wall to pretend that he has had a traffic accident. Eyewitness B comes to the scene of the accident and cries out: "Jesus! Did you have an accident?" A replies: "No. I crashed into the wall deliberately [*e*]."

(Falkenberg 1982, 126,

based on Agatha Christie's *Why didn't they ask Evans?*)

It must be noted that the literature distinguishes among different kinds of irony, not only as for their pragmatic uses but also as for their structures (Gibbs and Colston 2007). It is postponed to future research to verify that ReALIS theory can be applied to all of them.

Let us consider a case mentioned in Gibbs and Colston's book to which ReALIS can readily be applied (Clark and Gerrig 2007, 30). Suppose it is common ground to Harry, Tom, and Anne that none of them can abide the poetry of Ezra Pound. Now suppose that Harry and Tom have just been to a lecture on Pound that they agreed was unexpectedly fascinating. As they meet Anne coming out of the lecture, Harry says the following: *Tedious lecture, wasn't it?*

With this, Harry is being ironic to Tom, but not to Anne. Without knowing that the boys enjoyed the lecture, Anne cannot be a party to Harry's irony, because as far as she can tell, he is completely serious. She has no way of recognizing Harry's pretense. Speakers, thus, are not just ironic; they are ironic only to certain listeners.

The phenomenon can be accounted for in our approach with the aid of the above-mentioned observation according to which the intonation does not necessarily help the reader/listener to determine whether a particular sentence has been performed ironically or not, but he/she can still make a decision using his/her earlier knowledge. In the story above, thus, Tom can calculate, on the basis of the content of an appropriate worldlet of his containing up-to-date information, that Harry was being ironic, since otherwise inconsistency would emerge; while Anne is not in a position to recognize inconsistency and, through this, to identify irony.

6. Conclusions and loose ends

The application of polarity values in the formal approach outlined in this paper can make it possible to capture various further factors of communication such as register, (temporary) role, situation, politeness, cautiousness and face saving. Such objectives will guide our future research plans.

The pattern of the polarity labels below (an adaptation of the pattern under (8) in 3.1) illustrates another possible area of research, where we intend to extend the formal descriptive potential of *ReALIS* as part of our global objective to build a bridge between pragmatics and hardcore formal semantics. What is formulated below is the information state of a person who raises a question in an ideal communication situation:

(22.1) $\langle \text{BEL}, \text{max}, \text{s}, \tau, 0 \rangle$

(22.2) $[\langle \text{BEL}, \text{great}, \text{s}, \tau, + \rangle \langle \text{BEL}, \text{max}, \text{i}, \tau, \theta \rangle]$

(22.3) $[\langle \text{DES}, \text{max}, \text{s}, \tau, + \rangle, \langle \text{BEL}, \text{max}, \text{s}, \tau', \theta \rangle]$

(22.4) $[\langle \text{INT}, \text{max}, \text{s}, \tau, + \rangle \langle \text{INT}, \text{great}, \text{i}, \tau, + \rangle \langle \text{BEL}, \text{max}, \text{s}, \tau', \theta \rangle]$

It is assumed that the speaker does not know the answer (22.1), but wants to obtain it (22.3); furthermore, he/she believes that the addressee knows the answer (22.2) and intends to persuade him/her to be inclined to provide it (22.3). We hope that the reader accepts that pattern (22) is suitable for serving as a starting point to describe all sorts of "deviant" situations of asking questions – similar to the way in which the pattern shown in (1)–(8) has served as a starting point to capture the different deviant communication situations relating to various performances of a declarative sentence.

Table 3. Sentence modalities

Declarative	Imperative	Interrogative	Optative	Exclamative
$\langle \text{BEL}, \text{max}, \text{s}, \tau, + \rangle$	$\langle \text{BEL}, \text{max}, \text{s}, \tau, - \rangle$	$\langle \text{BEL}, \text{max}, \text{s}, \tau, 0 \rangle$	$\langle \text{BEL}, \text{max}, \text{s}, \tau, - \rangle$	$\langle \text{BEL}, \text{max}, \text{s}, \tau, + \rangle$ $\langle \text{BEL}, \text{max}, \text{s}, \tau', 0 \rangle$ ($\tau' < \tau$)
$\langle \text{BEL}, \text{great}, \text{s}, \tau, + \rangle$ $\langle \text{BEL}, \text{max}, \text{i}, \tau, 0 \rangle$	$\langle \text{BEL}, \text{great}, \text{s}, \tau, + \rangle$ $\langle \text{BEL}, \text{max}, \text{i}, \tau, - \rangle$	$\langle \text{BEL}, \text{great}, \text{s}, \tau, + \rangle$ $\langle \text{BEL}, \text{max}, \text{i}, \tau, \theta \rangle$		
$\langle \text{BEL}, \text{great}, \text{s}, \tau, + \rangle$ $\langle \text{DES}, \text{great}, \text{i}, \tau, + \rangle$ $\langle \text{BEL}, \text{max}, \text{i}, \tau', \theta \rangle$	$\langle \text{DES}, \text{max}, \text{s}, \tau, + \rangle$	$\langle \text{DES}, \text{max}, \text{s}, \tau, + \rangle$ $\langle \text{BEL}, \text{max}, \text{s}, \tau', \theta \rangle$	$\langle \text{DES}, \text{max}, \text{s}, \tau, + \rangle$	$\langle \text{DES}, \text{max}, \text{s}, \tau, + \rangle$ or $\langle \text{DES}, \text{max}, \text{s}, \tau, - \rangle$
$\langle \text{INT}, \text{great}, \text{s}, \tau, + \rangle$ $\langle \text{BEL}, \text{max}, \text{i}, \tau', + \rangle$	$\langle \text{INT}, \text{max}, \text{s}, \tau, + \rangle$ $\langle \text{INT}, \text{max}, \text{i}, \tau, + \rangle$	$\langle \text{INT}, \text{max}, \text{s}, \tau, + \rangle$ $\langle \text{INT}, \text{great}, \text{i}, \tau, + \rangle$ $\langle \text{BEL}, \text{max}, \text{s}, \tau', \theta \rangle$		

Let us consider two instances of “deviant” interrogative situations. If the zero is replaced with a plus in (22.1), we obtain the kind of question typically raised by detectives, for instance (cross-examination), or teachers (exam questions). If the plus is replaced with a zero in (22.2), we get a case in which the questioner does not really hope that any other participant in the conversation (the potential answerer(s)) would know the answer. The discourse particle *vajon* ‘whether’ is to be inserted in a question like this in order to indicate the reduced expectations; see Gärtner and Gyuris’s (2012) paper and Section 4.1 in Kleiber and Alberti’s (in press) paper.

Finally, we would like to mention (without entering into details) that our approach is also capable of characterizing the performance of imperative, optative and exclamative sentences in a similar way, based upon the procedure of permuting and combining the four polarity values in the interlocutors’ information states (cf. Table 1 in 3.1).

Acknowledgments

We are grateful to SROP-4.2.1.B-10/2/KONV/2010/ KONV-2010-0002 (Developing Competitiveness of Universities in the Southern Transdanubian Region) for their contribution to Judit Kleiber’s costs at the 2012 Macerata Conference on Uncertainty and for supporting our Research Team ReALIS in 2011–2012. In 2013 ReALIS is supported by SROP-4.2.2.C-11/1/KONV-2012-0005 (Well-Being in the Information Society); the final version of this paper is due to this project.

References

- Alberti, Gábor. 2005. “Accessible Referents in “Opaque” Belief Contexts.” In *Proc’s of 9th ESSLLI Belief Revision and Dynamic Logic Workshop*, ed. by Hans van Ditmarsch, and Andreas Herzig, 1–7. Edinburgh: Heriot-Watt University.
- Alberti, Gábor, and Márton Károly. 2012. “Multiple Level of Referents in Information State.” In *Computational Linguistics and Intelligent Text Processing, CICLing2012, LNCS7181*, ed. by Alexander Gelbukh, 349–362. Berlin Heidelberg: Springer Verlag.
DOI: 10.1007/978-3-642-28604-9_29
- Alberti, Gábor, Márton Károly, and Judit Kleiber. 2010. “The ReALIS Model of Human Interpreters and Its Application in Computational Linguistics.” *Proc. of ICISOFT 2010, 5th International Conference on Software and Data Technologies, Athens, Greece*, Vol. 2, 468–474. Portugal: SciTePress.
- Alberti, Gábor, and Judit Kleiber. 2012. “Where are Possible Worlds? (Arguments for ReALIS).” *Acta Linguistica Hungarica* 59 (1–2): 3–26. DOI: 10.1556/ALing.59.2012.1-2.1

- Asher, Nicholas, and Alex Lascarides. 2003. *Logics of Conversation*. Cambridge: Cambridge University Press.
- Bussmann, Hadumod. 1996. *Routledge Dictionary of Language and Linguistics*. London and New York: Routledge.
- Clark, Herbert H., and Richard J. Gerrig. 2007. "On the Pretence Theory of Irony." In *Irony in Language and Thought*, ed. by Raymond W. Gibbs, and Herbert L. Colston, 25–33. New York: Lawrence Erlbaum Associates.
- Falkenberg, Gabriel. 1982. *Lügen. Grundzüge einer Theorie sprachlicher Täuschung*. Tübingen: Niemeyer.
- Gärtner, Hans-Martin, and Beáta Gyuris. 2012. "Pragmatic markers in Hungarian: Some introductory remarks." *Acta Linguistica Hungarica* 59: 387–426.
- Gibbs, Raymond W., and Herbert L. Colston. 2007. *Irony in Language and Thought*. New York: Lawrence Erlbaum Associates.
- Grice, Paul. 1975. "Logic and Conversation." In *Syntax and Semantics* 3, ed. by Peter Cole, and Jerry L. Morgan, 41–58. New York: Academic Press.
- Kamp, Hans, Josef van Genabith, and Uwe Reyle. 2011. "Discourse Representation Theory." In *Handbook of Philosophical Logic* 15, ed. by Dov Gabbay, and Franz Guenther, 125–394. Berlin: Springer-Verlag.
- Károly, Márton, and Gábor Alberti. 2013. "The Implementation of a ReALIS-based Method of Static Intensional Interpretation." In *Proceedings of KEOD 2013, 5th International Conference on Knowledge Engineering and Ontology Development (Vilamoura, Portugal, 19–22 September 2013)*, ed. by Joaquim Filipe, and Jan Dietz, 393–398.
- Kleiber, Judit, and Gábor Alberti. In press. "Uncertainty in Polar Questions and Certainty in Answers?" In *Certainty–Uncertainty – and the Attitudinal Space in Between*, ed. by Sibilla Cantarini, Werner Abraham, and Elisabeth Leiss. Amsterdam: John Benjamins.
- Meibauer, Jörg. 2005. "Lying and Falsely Implicating." *Journal of Pragmatics* 37: 1373–1399. DOI: 10.1016/j.pragma.2004.12.007
- Posner, Roland. 1980. "Semantics and Pragmatics of Sentence Connectives in Natural Language." In *Speech Act Theory and Pragmatics*, ed. by John R. Searle, Ferenc Kiefer, and Manfred Bierwisch, 168–203. Reidel: Dordrecht.
- Ruzsa, Imre. 2001. *Bevezetés a modern logikába* [Introduction to modern logic]. Budapest: Osiris.