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## Towards a cognitively viable linguistic representation

### Abstract

Sentence-size propositional contents should be constructed in formal semantics so that the resulting formulas can undergo truth evaluation in *arbitrary* possible worlds. This paper claims that the basic task of pragmatics can be reformulated as the designation of *certain* possible worlds on the basis of the linguistic form created by the speaker. A formal dynamic pragmatics can capture the linguistic phenomena traditionally described in such Searlean concepts as illocutionary act/effect and perlocutionary effect via designating the *relevant* subset of the basis of interpretation. In the possible world of addressers' beliefs, for instance, the ideal truth values according to the three conventions are +1, 0, and -1. The  $\Re$ ALIS framework serves as the theoretical background for our research. It can be regarded as the representationalist counterpart of Lauer's antirepresentationalist dynamic pragmatics, provided that the first steps of both models are aimed at deciding what truth values the declarative, interrogative and imperative conventions "expect" in the addresser's and he addressee's definite possible worlds. The paper concludes with the take-home message that  $\Re$ ALIS, in spite of its Montagovian fundament, aims at serving as a "cognitively viable linguistic representation" (Andor 2011: 1).

*Keywords:* major sentence types; representational dynamic discourse semantics; mental states; bluff; lie

### 1 Introduction

Our point of departure is the following distinguished purpose of the Montagovian formal semantics (Dowty et al. 1981). Sentence-size propositional contents should be constructed so that the resulting formulas can undergo truth evaluation in *arbitrary* possible worlds. This paper claims that the basic task of pragmatics can be reformulated as the designation of *certain* possible worlds on the basis of the linguistic form created by the speaker.

The  $\Re$ ALIS framework, defined in Alberti (2011), serves as the theoretical background for our research.<sup>2</sup> It can be regarded as the representationalist counterpart (Kamp et al. 2011) of Lauer's (2013) antirepresentationalist dynamic pragmatics, provided that the first steps of both

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<sup>1</sup> We are grateful to EFOP 3.4.3; this project has made it possible for us to elaborate the scientific results provided in this paper.

<sup>2</sup> Different aspects of  $\Re$ ALIS are demonstrated in the following papers, among others: Alberti & Kleiber (2012, 2014), Farkas & Ohnmacht (2012), Alberti, Dóla & Kleiber (2014), Alberti, Vadász & Kleiber (2014), Alberti & Nóthig (2015), Kleiber, Alberti & Szabó (2016), Alberti, Kleiber, Schnell & Szabó (2016), Alberti, Kleiber & Kárpáti (2017), Szeteli, Alberti, Kleiber & Dóla (2018), Nóthig & Szeteli (2018).

models are aimed at deciding what truth values the declarative, interrogative and imperative conventions “expect” in the addresser’s and the addressee’s definite possible worlds. A formal dynamic pragmatics, in our conceptualization, can capture the linguistic phenomena traditionally described in such concepts as illocutionary act/effect and perlocutionary effect (e.g. Searle 1979) via designating the relevant subset of the basis of interpretation. In the possible world of the addresser’s beliefs, for instance, the ideal truth values according to the three conventions are +1, 0, and –1, respectively. In a declaration, the conveyed proposition *e* is thought to be true. In a question, the truth of *e* is unknown. The one who performs an imperative sentence should think that *e* (still) does not hold. It can also be truth-evaluated in a like manner whether the addresser assumes the addressee to consider *e* true, to long for its realization, or to be able to carry it out. This recursion can then be followed iteratively in order to consider possible worlds such as those which can be characterized by questions like this: what are the addresser’s beliefs, desires and intentions concerning the addressee’s beliefs, desires and intentions concerning them themselves, the addresser (Wimmer & Perner 1983). Conforming to such expectations guarantees smooth communication.

The goal that guides us, which is actually quite a practical one, is to systematically take account, in the framework of a representationalist dynamic pragmatics, of the possible worlds factually used in everyday communication. We intend to explore not only the possible worlds evoked by the major sentence types but also those evoked by discourse markers. The description of intensional profiles of the sentence types and discourse markers, that is, the knowledge about “how to read each others’ minds” on the basis of purely linguistic information, can then be applied in at least three areas. These are mother tongue education, teaching Hungarian as L2, and socio-communicative development of highly functioning individuals with autism or similar disorders.

Nevertheless, we are aware of the fact that the speaker can show an addresser’s profile which does not meet the current information state of their mind. By a declaration in which *e* is said to be true, for instance, the speaker, who knows that *e* is actually false, can tell a lie. Or they can bluff if they have no idea whether *e* is true or false, or at the least there is no reliable knowledge on the truth value of *e* at their disposal. Even a yes-or-no question is suitable for deceiving the addressee if the addresser knows the exact the answer to their question, since, as pointed out above, a question provides an intensional profile according to which the speaker does not know the truth value of the given proposition. Such misuses, or “creative/indirect uses”, of communicative means can be captured and defined in our possible-world based approach which makes a comparison of truth values appearing in different worlds, in relation to one another. It all boils down to a question of pattern matching between (i) addresser’s/addressee’s roles stored in language in a conventionalized way and (ii) human information states on the basis of the speaker and the listener may be entitled to playing these roles (Oishi 2014, 2017).<sup>3</sup>

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<sup>3</sup> Oishi (2017: 338) offers a (terminological re-) interpretation of Austin’s felicity conditions (1975: 14–15) as follows: “To clarify how an illocutionary act is performed felicitously and brings about an effect, let us specify the terminology. A particular speaker in a given case who makes an utterance ... is distinguished from the performer who performs a particular illocutionary act ..., whom we call the *addresser* of the act. The hearer to whom the speaker speaks ... is also distinguished from the person to whom the illocutionary act is performed ..., whom we call the *addressee* of the act. The circumstances of the situation in which an utterance is made ... are distinguished from the *context* of the act ... The illocutionary act brings about its conventional effect when (i) the speaker, the hearer, and the circumstances of the speech situation are assumed to be the addresser, the addressee, and the context of the act, respectively ..., (ii) the speaker follows the procedure correctly ..., (iii) the hearer ratifies the act (or the speaker makes a specific sequel) for the

Let us now overview the structure of the paper. Section 2 sketches the relevant elements of the *ReALIS* toolbox in the context of related pragmasemantic approaches. Section 3 provides the formal description of the intensional profiles of the three major sentence types. Lying and bluffing are discussed in Section 4. The paper concludes with a short summary and the take-home message that *ReALIS*, in spite of its Montagovian fundament (Dowty et al. 1981), aims at serving as a “cognitively viable linguistic representation” (Andor 2011: 1), as such, it can be seen as an exception to Searle’s pessimistic panorama on formal-semantics based theories (Andor 2011: 8–9):

[B]asically, the development of formal semantics has given us a sophisticated intellectual apparatus that gives us the illusion that we are achieving understanding. But it seems to me, we are not. I mean, ... the Tarskian set theoretical analysis of truth, a tremendous formal achievement, seems to me to add nothing to the understanding of truth, what it is for a proposition to be true. [The contemporary mainstream development] in the philosophy of language ... is more and more formalistic, more and more a matter of developing formal model theories, formal semantics for different types of expressions. As far as I know, without exception, they have not, actually, increased our insight. We are not much better off understanding how does language actually work in human communication. Now, if you concentrate on certain types of utterances, then communication doesn’t seem to be very important. Two plus two equals four? Who cares how it is communicated? But I think we won’t understand the aspects of language that interest me [Searle]: how it relates to human life, how it relates to society, how it relates to human interaction, unless you see its role in the actual performance of speech acts by actual speakers.

## 2 *ReALIS*

To represent the (finite) information which is at the interlocutors’ disposal in any discursive situation, we use a finite structure we call *worldlet*. A wordlet is essentially a Kampian discourse representation unit but one of mental nature; it is assumed to be stored in the interlocutors’ mind as part of their current information state.<sup>4</sup> In the course of the description of both the conventionalized intensional profiles of the sentence types or the discourse markers and the interlocutors’ underlying mental states, it is essential to account for the propositions in question as true, undecided, or false – in accordance with the collections of pieces of information that the certain worldlets consist of. Instead of the usual triplet of  $\langle +1, 0, -1 \rangle$ , however, we go as far as proposing an 11-degree scale of fifths in order to capture “certainty-uncertainty – and the attitudinal space in between” (see Cantarini et al. 2014, this is the title of the volume). Falseness, then, will correspond to  $-5/5$ , while  $-3/5$  refers to the evaluation “quite probably not hold,” for instance. Instead of such fractions, however, we are going to use the set  $\langle -5, -4, -3, -2, -$

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procedure to be completed ..., (iv) the speaker has the thought or feeling, or intention of the addresser of the act ..., and (v) the speaker or the hearer conducts her/himself subsequently as is specified for the addresser/addressee of the act.”

<sup>4</sup> It is established practice in the post-Montagovian realm of formal pragmasemantics to base theories on infinite (sets of) possible worlds. It is admitted, however, even in the Montague-handbook itself (Dowty et al. 1981: 124) that possible-world constructions have “dubious foundations” (another addition to Searle’s pessimistic panorama on formal-semantics based theories): “Would this [the possible-world construction] be an enlightening way of analyzing the semantics of *necessity* and *possibility*? Many philosophers of language have unequivocally answered „no” to this question; they have contended that since „possible worlds” are surely vague and ill-understood entities..., it cannot help to explain one mysterious semantic concept (necessity) in terms of an even more mysterious one (possible worlds).”

1,0,+1,+2,+3,+4,+5) of whole numbers. Truth and falseness will thus be expressed by the whole numbers  $-5$  and  $+5$ , respectively. Whether this granularity is sufficient will depend on the question whether, within the system of intensional profiles, discourse markers of a language can be properly distinguished.<sup>5</sup>

As *ReALIS* belongs to the family of discourse representation theories (e.g. Kamp 1981, Kamp et al. 2011), it is worth considering at this point one specific branch of the field: the one that aims at capturing interlocutors' mental states Maier (e.g. 2010, 2016) is an active representative of this branch. He (Maier 2016: 476) speaks about Kamp's (1981) original motivation of reconciling Fregean formal semantics, as championed at the time by Montague ..., with a traditional, Lockean cognitive theory of communication in terms of speakers' and hearers' mental states as follows:

Kamp in his original presentations actually describes DRSs as representations of the mental state of the hearer, rather than of the more abstract notion of a Stalnakerian common ground. ... Linguists have since stripped DRT of its cognitive interpretation. But Kamp and a few others have kept it alive, even extending DRT to a full-blown representational theory of attitudes.

Maier (2016) presents a version of such a DRT-based theory of mental states known as Attitude Description Theory. As an illustration, let us consider an Attitude Description Set, which represents the different attitudes (belief, desire, imagination) separately, as distinct DRS boxes that all have access to the discourse referents introduced by the anchors:

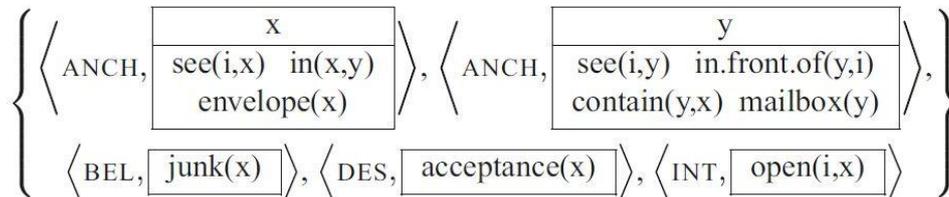


Figure 1. DRS-Based Representation of Mental States (Maier 2016: 477)

It represents “the mental state I’m in when I look in my pigeon hole at work and see an envelope [SEE], believe it’s publisher’s junk mail [BEL], hope it’s a letter of acceptance for a recent grant application [DES], and intend to open it right away [INT]” (Maier 2016: 477).

The starting point of ADT is that mental states are (i) compartmentalized into beliefs, desires, fears, intentions, etc., and (ii) these compartments are highly interconnected. For instance, “my mental state could contain the belief that there’s a monster under my bed and, dependent on that

<sup>5</sup> The problem of attitudinal scales is interrelated with the problem of gradation, raised by Andor (2011: 4) as follows: “...marked differences in the gradation of the intensity of the expressed communicative force can also be traced, decoded by the hearer. Do you hold or accept that illocutionary force is a gradable notion? The meaning of the term “force” definitely refers to such an idea. On what grounds can the hearer correctly and reliably interpret, decode such gradational differences? How can such differences be identified, not to say, experimentally measured by the researcher?” The crucial point of Searle’s answer is that “...directives have the same illocutionary point, but there are differences within different types of directives, and differences in force or strength is one of the differences. So yes, the answer to that is, it is definitely the case that there are gradations, that it is a scalar phenomenon, the force or strength with which the illocutionary point is presented” (Andor 2011: 5).

belief, the hope that *it* won't wake up. This dependence is cashed out in the same way as anaphoric dependencies in discourse are modeled in standard DRT, viz. by sharing accessible discourse referents" (Maier 2016: 476).

The formal definition of  $\Re$ ALIS (Alberti 2011) provides a useful ontological innovation (Alberti & Kleiber 2014) in the above respect: for a discourse referent to be "in the crossfire" of several mental attitudes is not an exceptional situation but the base case scenario. This also holds for eventual referents (which refer to states of affairs, events, actions). That Fanni kissed Ede, for instance, can be a sensorial experience for an accidental witness (E: experience), as well as a belief for her sister (B: belief, "it is likely that there was a kiss..."), which the sister, say, is glad about (D: desire). It might also be that kissing Ede appeared among Fanni's plans at a certain moment (I: intention). Attitudes can also be embedded in each other recursively. Fanni's plan, for instance, can be conjectured by her sister, placing the given eventual referent in a B–I type worldlet. Suppose further that their brother knows nothing about Fanni's sister's conjecture: this way we have reached a B–B–I type worldlet.

The thesis of  $\Re$ ALIS is that conglomerates of such worldlets of complex indices are mobilized in interlocutors by discourse markers, after having set certain worldlet combinations as basic values via selecting the sentence type.<sup>6</sup> In everyday communication, these worldlets are more or less mutated partial mirror images of each other. From our Montagovian formal semantic departure, thus, we can arrive at the same questions as mind theorists, who conduct research into how and to what extent we attempt to see into each other's minds, that is, how we can mentalize each other (Wimmer & Perner 1983).

It is commonplace that language is a means at human beings' disposal by which they can express their beliefs, desires, intentions, and several further objects of worlds hidden in their minds in numerous ways. What we aim at demonstrating in what follows (and in all of our  $\Re$ ALIS-papers) is that, within this huge world structure, the substructures evoked by given linguistic items can be much more precisely and formally identified, as many would think. What obscures then this alleged concreteness for the researchers? The interlocutors' freedom to not only use the worldlet-mobilizing potential of sentences but also take false advantage of it, or at least, the ability of using it "creatively" or indirectly.

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<sup>6</sup> It is not an accident that Lauer's (2013: 4–5) formal-semantics based Dynamic Pragmatics has the same point of departure as that of  $\Re$ ALIS, in contrast to less formal branches of pragmatics: „There is surprisingly little work on the conventional link between clauses of different types and their use, at least in the formally-oriented semantics literature. There was some early work on this issue in philosophy (e.g., Lewis (1975)), but soon, it seems, researchers abandoned the issue. In part this was likely due to the fact that the dominant paradigm in speech act theory (i.e., that of Searle (1969, et seq.)) made the project of assigning a conventionally-specified use to sentences based on their type seem hopeless: Sentences of any given type can be used to perform acts of almost any given Searlean illocutionary type. Developing a systematic framework for studying the conventionally specified use of sentences of different types is thus a very timely project. Secondly, it is this conventional connection between sentences and their use that connects semantic content, as it is studied in linguistics, with language use, and inferences about utterance choice. As I just pointed out, the classical Gricean [1975] account of implicatures starts from the assumption that a speaker utters a (declarative) sentence in order to convey information, and thus ... presupposes an answer to the question of how sentences are conventionally associated with a certain use. And if we want to take a Gricean perspective more generally—if we want to investigate how interlocutors reason about each other's action choices—we need to know how the contents we study in linguistic semantics relate to the use of sentences. An understanding of clause typing thus is central to developing a formal framework that lets us take a pragmatic perspective in general.”

More profoundly, the freedom to lie, to deceit, and so on. In general, by this freedom we mean the addresser's ability to make the addressee construct an information-state segment in their mind on the basis of a segment in their own (the addresser's) mind, different from the one in their (the addresser's). As such activities form an integral part of everyday communication, a promising approach should rely on a parallel investigation of conventionalized structures evoked by linguistic forms and mental structures constructed by mistrusting, or at least cautious, addressees on the basis of their preliminary expectations. It is such parallel analyses that listeners should base their final decisions on when drawing their conclusions from speaker messages. All in all, we consider it a necessary condition for any formal semantics-based approach to pragmatics to be committed to a cognitive description of mental states. *ReALIS* (Alberti 2011) enables us to be so by applying the one and the same formal apparatus to linguistic representations and to representations of the mind, fed by linguistic representations.<sup>7</sup>

The system of worldlets that our approach is based on rests upon their labeling. Attitudes such as belief (B), desire (D), and intention (I), appearing in Maier's representation, are also central components of the last decade's *ReALIS*-descriptions. This BDI-language has recently been completed with an attitude we refer to as authority (A).<sup>8</sup> As our beliefs, desires and other attitudes are in permanent change, a dynamic pragmasemantic theory should capture this temporal feature. It should also capture the property of communication that a person—say, in the dimension of B-attitude—considers true other things than another person does. In addition to the attitudinal component, thus, a worldlet label should also contain a temporal “stamp”, as well as some reference to the host of the given worldlet.

As an illustration, let us consider the following three triplets: *iD0*, *uB+*, *oA*. The first characters in the sequences refer to the addresser ('I'), the addressee ('you'), and someone who does not take part in the conversation under consideration ('other'). The third characters mark points of time relative to the utterance time 0 as follows: '+' refers to a later one and '-' to a previous one. Thus, *iD0* indicates the worldlet of “my present desires”, *uB+* that of “your later beliefs, and *oA* the simplified indication of a third person's authority. Such labels can be built on each other in unbounded recursion. The worldlet with the label *iBuBiB*, for instance, is a distinguished one for mentalization: it is a collection of the addresser's beliefs concerning the addressee's beliefs about the addresser (“I believe that you believe that I believe...”). In other words, what is registered here is how “I assume you to see me.”

We conclude the section with a graphical summary of the basic scientific tenets laid down above.

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<sup>7</sup> By representing mental states as lifelong discourse representation structures with possible worlds inside, *ReALIS* offers a solution to the basic problem of the Amsterdam School (Groenendijk et al. 1996) along with the attractive visual representations that Kamp's DRT is famous for. In their insistence on Montague's (Fregean) antipsychologist “heritage”, the antirepresentationalist Amsterdam School strives to eliminate exactly this level of discourse representation from the levels of linguistic representation and world models. *ReALIS* cuts the Gordian knot by replacing the discourse level, meant to be eliminated, with a rich world model including models of interlocutors' minds in communication with each other.

<sup>8</sup> In his argumentation for a systematic relation between indirect speech acts and the theory of speech acts, Searle (1979: 30–57) mentions ability. “And that is that the reason you can ask somebody to do something by asking them if they are able to do it, or by telling them that they are able to do it, is that the ability is a condition, it is a preparatory condition on the performance of the directive speech act” (Andor 2011: 5). Our component Authority is a generalization of Searle's Ability.

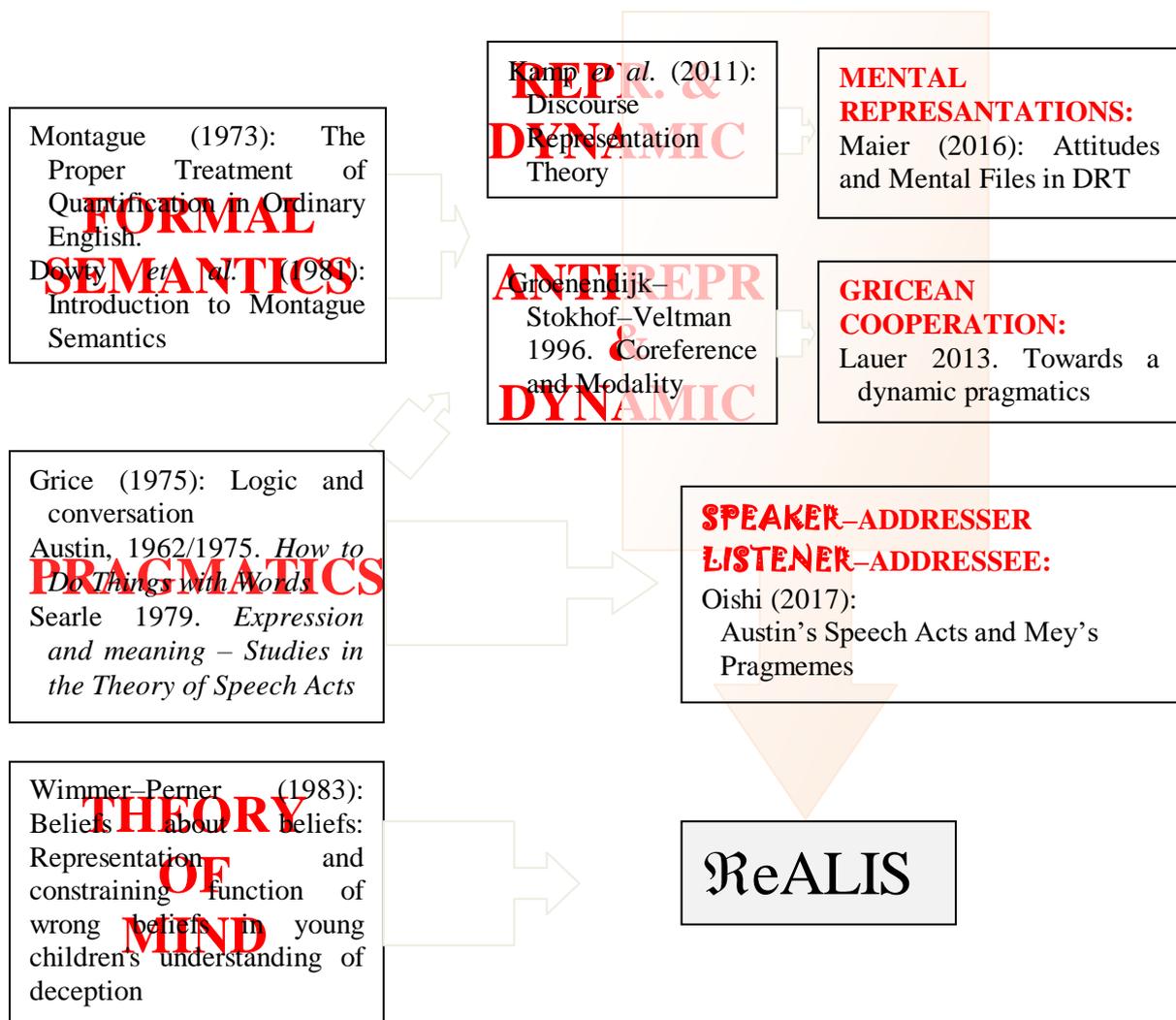


Figure 2. The System of Scientific Antecedents of ReALIS

### 3 Intensional Profiles of the Three Major Sentence Types

This section presents the intensional profiles of what Sadock and Zwicky (1985) call the ‘major sentence types’: declaratives, interrogatives and imperatives. On the distinguished relevance of basing a dynamic pragmatics on the three major sentence types, see Lauer (2013: 35).<sup>9</sup>

<sup>9</sup> Lauer (2013: 1) qualifies his approach as „pragmatics, in a broadly Gricean sense. It is not ... about conversational implicatures, at least not in the classical sense of the term. [It concentrates] ... on a question that may seem quite un-Gricean, due to its focus on linguistic convention: What kind of linguistic convention makes it so that sentences of different types—such as declaratives, interrogatives and imperatives—are used in different ways, and support different kinds of pragmatic inferences? This question, however, will be addressed from a very Gricean angle. Pragmatic inference is construed as language users’ reasoning about utterance events. Or, more precisely, as language users’ reasoning about how utterance events are chosen. A central aim ... is to show that consistently taking such a perspective is fruitful, indeed, necessary if we want to understand language use.” Lauer (2013: 1) intends to develop a formal framework, Dynamic Pragmatics, that “enables us to consistently take such a Gricean perspective,” on the basis of antirepresentationist dynamic semantics

### 3.1 *What do we know, what do we long for, what do we have authority over, and on the basis of all this, what do we want from the listener?*

Language serves as a means of carrying out speech acts. ... I [Searle] find it useful to restrict the notion of a speech act to something that has an illocutionary force and a propositional content. ... [F]or a speech act, using it as a technical term, then I think it ought to be restricted to the case where you have the propositional content conveyed with a certain force (Andor 201: 17–18).

Our formally defined intensional profiles are designed to capture how a proposition  $e$  conveyed by a sentence is enveloped in possible worlds—or more precisely, in partial ones called worldlets—responsible for its illocutionary force. Truth evaluation in worldlets labeled  $iB$ ,  $iD$  and  $iA$ , on the one hand, and  $iBuB$ ,  $iBuD$  and  $iBuA$ , on the other, reveals what the ideal addresser, while performing a sentence with content  $e$ , believes, longs for, has authority over, and assumes the addressee to believe, long for, and have authority over. All this is then completed with the worldlet of intentions. In particular, the worldlet with label  $iIuI+$  plays a crucial role: “[I intend you to intend  $e'$ ]” where  $e'$  is a propositional content to be judged on the basis of  $e$ , the content immediately conveyed by the given sentence.

The general conception sketched in the previous paragraph is presented in a formalized way in Table 1 as an underspecified intensional profile with the name ‘target-oriented mentalization’. We attribute significance to such a fictive profile, which serves as the shared basis for the intensional profiles, which define the three major sentence types, primarily in the process of constructing our comprehensive mental system of conventionalized intensional profiles. We rest on the idea that in the course of language acquisition infants obtain so meagre data, at least compared to the high complexity of the system, that its acquisition requires that they often have recourse to such general methods of creating (lacking) truth values in profiles as compositionality (in the Fregean/Montagovian sense), opposition, and transferring values.

The profile of target-oriented mentalization describes a conscious being concentrating on a state-of-affairs  $e$ , whose  $[-5,+5]$  scale in the  $iB$ -dimension is exactly distributed into three disjoint intervals by the three major sentence types. Value  $-5$  provides profile for the speaker who, aware of the fact that  $e$  does not hold, intends to change that state of things, by calling the listener for help using an imperative sentence. The situation in which  $iB \in +5$  may stimulate readiness for cooperation: as information is valuable, supplying the listener with  $e$ , which the speaker knows to be true, is likely to serve the listener’s interest. The situation in which  $iB \in [-4,+4] = “0”$  can be construed as follows: the speaker is not in a position to carry out the former two types of action so their obvious aim can be to reach one of these states ( $iB \in +5$  or  $iB \in -5$ ); this can be initiated by taking the addresser role of a yes-or-no question.<sup>10</sup>

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(Groenendijk et al. 1996). ReALIS intends to elaborate a representationalist/mentalistic alternative of dynamic pragmatics.

<sup>10</sup> ‘ $n$ ’ and ‘ $n$ ’ denote a narrow and a broader interval around  $n$  in the following precise sense: the former symbol means a (bell-shaped) normal distribution over interval  $[n-2, n+2]$  while the latter one a flatter normal distribution over interval  $[n-4, n+4]$ . Symbols ‘ $n$ ’, ‘ $n$ ’, ‘ $n$ ’ and ‘ $n$ ’ denote the left/right half of the corresponding normal distributions. The interpretation of  $f(v)$  is that it is this much preferable for a speaker to select the given addresser role if the corresponding value in their mind is  $v$ . Let us consider an example. The condition  $iB \in “0”$  concerning the addresser role means that the speaker is, for instance, preferably to select the given role if they know nothing about the truth value of the given proposition (i.e.,  $iB \in 0$  in their mental state). Note also that the number  $n$  stands for the singleton  $\{n\}$  in formulas in which something is claimed to be an element of  $n$ .

Target-oriented mentalization	Declarative	Imperative	Interrogative
<i>For e</i> : $iB$	$iB \in +5_{\alpha}$	$iB \in -5_{\gamma}$	$iBiB \in \gamma \bullet \beta (-5 \bullet \pm 5)$ → $iB \in "0"$
$iBuB \in " +5,$ $iBuB \in iB$ or $iB^*$	$iBuB \in \alpha^*$	$iBuB = \gamma$	$iBuBiB \in \beta (" +5 \bullet \gamma' \bullet \pm 5)$ → $iBuBiB \in " +5 \bullet (') +5 \bullet "0"$
<i>For e'</i> : ...•W, $r \in R \subseteq \{i, u, o\},$	$W = uB+$	Default: $e' = res_e$	$W = iB+$
$(\Sigma iB \cdot rD) /  5R  \in " +5$	$iBrDuB+ \in \pm 5_{\beta}$	<i>For e'</i> : $iBrD$	$iBrDiB+ \in \beta$
$iBuA \in " +5 \bullet " +5$	$iBuAuB+ \in \beta$	<i>For e'</i> : $iBuA$	$iBuAiB+ \in \beta$ A factor: $iBuB \in \beta$
<i>For e''</i> : $iIuI+ \in " +5 \bullet +5$	$iIuI+uB+ = \alpha$	<i>For e</i> : $iIuI+$	$iIuI+iB+ \in \beta$
$iAiIuI+ \in " +5$	$iAiIuI+uB+ = \alpha$	<i>For e</i> : $iAiIuI+$	$iAiIuI+iB+ \in \beta$

Table 1. The Three Basic Conventionalized Intensional Profiles and Their Shared Basis

The second step in the profile of target-oriented mentalization concerns the addressee. The question is what kind of knowledge (concerning *e*) renders the listener suitable for the addressee role. As we are attempting to reveal the background of major sentence types which are not modified by discourse markers, the knowledge that belongs to the addressee role can be either the same as, or the opposite of, the knowledge of the addresser. More special relations should be marked (by discourse markers). The imperative will specify the background in the former way: it is on this—shared negative—basis that the speaker can call for joining forces in order to change the (unwanted) state of things. As for the latter way, what makes sense of the declarative type is exactly the uninformedness of the listener:  $iBuB \neq +5$ , with a speaker informed.<sup>11</sup> A similar opposition makes sense of the interrogative type, too: now it is the listener who is assumed to be informed:  $iBuB \in \pm 5$ , with the speaker uninformed in respect of the truth value of *e*. Note that the informed status of *u* can mean both knowing that *e* is true or that it is false. The *iB* component in label *iBuB* is responsible for mentalization (“What I think about you is that...”). The model we present in the table is that its value is “+5 (i.e., the left half of a bell-shaped distribution), in the case of worldlets *iBuD* and *iBuA*, too. That is, the speaker’s ideal position is to have sure knowledge on the listener’s given attitude (+5). The worst (still acceptable) case can be formulated as follows: it arises in the speaker’s mind as a possibility ( $iBuX = +1$ ) that the given attitude *X* is such that is prescribed in the given intensional profile as the value of  $iBuX$ . This approach to mentalization is very permissive and uniform; it expresses our experiences gained so far in the course of our research activity which offer no support for the idea that the speaker should monitor the attitudinal dimensions *uB*, *uD* and *uA* differently.

The speaker thus concentrates their attention to an eventuality *e* and assesses what they themselves and their listeners know about the truth value of *e*. The next question then is as to what desire moves the speaker to the given speech act. It can generally be claimed that this desire pertains to an eventuality *e'* which has to be construed on the basis of *e*. Hence, in worldlets *iD* and *iBuD*, it is *e'* that is there to be evaluated. As for authority, the listener has entire authority

<sup>11</sup> The given value pertains to the underlined part of the complex label in question (but underlining is omitted if this can cause no misunderstanding). If a pair or triplet belongs to a complex part of a label, the corresponding values are connected by the symbol ‘•’.

(+5) over  $e'$  in an ideal case while the in worst case (+1) they might be able to execute  $e'$  ( $iBuA \in +5$ ). In the case of an imperative,  $e'$  essentially coincides with  $e$ ; only the truth value of  $e$  should be reversed. As declaration and interrogation aim at transmitting some knowledge on  $e$ ,  $e'$  should be defined on the basis of output information states  $uB+$  and  $iB+$ . If, for instance,  $e$  is the state that Fanni is vegan, then  $e'$  is the event that [the appropriate interlocutor learns that Fanni is vegan].

It has not been discussed yet which interlocutor's interest is to be served in the case of the major sentence types. The hypothesis we will argue for is that the “discourse-markerless” basic case is when the decision has not been made but the speaker enforces some kind of summarized interest by using the major intensional profiles. In the table, the formula with summation is devoted to the formulation of this approach; subsections 3.2, 3.3, and 3.4 will provide explanation.

The general formulation of addresser's intention should be related to an eventuality  $e''$ , also to be calculated on the basis of  $e$ , whose achievement is assumed to require the addressee's aid ( $iIuI+$ : [I intend you to intend  $e''$ ]). In the imperative the ultimate intention will pertain to the resetting of the truth value of  $e$  in the external world, whilst declaratives and interrogatives serve the purpose of resetting the generalized truth value of  $e$  in certain interlocutors' output information states.

Another generalization formulates when a speaker can take the addresser role of an intensional profile. They are in a position to take it if their intention to influence the partner does not violate any criterion of authority ( $iAiIuI+ \in +5$ ), or at least they think to have some argument for having this authority ( $iAiIuI+ = +1$ ).

To sum up, this subsection has attempted to capture what is common in the three major intensional profiles. There is a potential speaker concentrating on an eventuality  $e$ . They are speculating about  $e$ . What they reach will serve as a point of departure for something whose realization they imagine to carry out with the aid of an addressee selected and mentalized. This process may then halt at the level of a thought experiment, or get specified into the intensional profile of one of the major sentence types resulting in the performance of a speech act.

### 3.2 Imperative profile

As we strive for explanatory adequacy, we hypothesize that children—on the basis of the meagre data set available to them—hold possession of the system of intensional profiles as follows. Only certain “generator values” should be set and keep in mind; they appear with a black background in Table 1. Other values in the profiles are decided by means of general constraints requiring certain values to equal or to stand in complementary distribution. The  $iBuB$ -values in the general target-oriented mentalization, for instance, are assumed to coincide with the  $iB$ -value or to be its opposite ( $\alpha^*$  is defined as the set consisting of the scale values which are not in set  $\alpha$  or  $\{\alpha\}$ ). Our ultimate endeavor is to derive certain fairly different intensional profiles by changing a single generator value.<sup>12</sup>

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<sup>12</sup> There is a third power functioning in the system of intensional profiles, which, due to space limitation, will be ignored in this paper (but see Alberti et al. 2018). This is essentially Grice's (1975) maxim of quantity, according to which one should try to be as informative as one possibly can. Its effect is that a sentence variant without a discourse marker cannot (necessarily) be used (with somewhat speaker-dependent differences) in a situation where—given that there is an alternative sentence variant featuring the proper discourse marker—our approach predicts the variant with the discourse marker to be “otherwise appropriate”.

We attempt to base the current model of profile system on the assumption that the *iB*-value always serves as a generator, that is, “what I know about the truth status of the given eventuality” is a definitive point of departure for the intensional profile in question. The *iB*-generator of the imperative is the value  $-5$ , as a truth value of the propositional content the given sentence conveys. The imperative in (1a), for instance, is senseless if Fanni is (already) vegan. The “negative knowledge” should be shared by the addresser and the addressee:  $\underline{iB}=-5=\underline{iBuB}$ , as illustrated by the rejecting reaction of a potential listener presented in (1b).

- (1) a. Fanni, légy vegán!  
 Fanni, be.Sbjv vegan  
 ‘Fanni, go vegan!’  
 b. Már egy éve vegán vagyok!  
 already for\_a\_year vegan be.1Sg  
 ‘I have already been a vegan for a year.’

Let us now turn to the dimension of desires and interests underlying them. Texts (2b,b’,b’’) are all potential continuations at the speaker’s disposal. The variants illustrate that, in the background of using the given imperative sentence (2a), there may stand the speaker’s desire (2b) as well as the listener’s one (2b’), or perhaps that of an outsider (2b’’). Moreover, to carry out *e* may be a common interest, at least in the speaker’s opinion (12c). Accounting appropriately for all these facts requires a flexible model.

- (2) a. Menj haza! R=?  
 go.Sbjv home  
 ‘Go home!’  
 b. I am fed up with you. R={i}  
 b’. It would be better for you at home now. R={u}  
 b’’. Are you saying this because of my husband? He is watching a match right now with his friends, and he prefers me not disturbing him at home.’ R={o}  
 c. (2a) + [I’m convinced that this way both of us will do better.]  
 $R=\{i,u\}; (\underline{iBiD}\cdot\underline{iBiD}+\underline{iBuD}\cdot\underline{iBuD})/10=(5\cdot5+3\cdot4)/10=3,7$

In an ideal model, the desires considered should be averaged, or rather, summarized as a first step. It is also worth considering that the speaker is likely to be aware of others’ desires in different degrees; it is the technique of weighting that the mathematical toolbox offers in such cases. The formula with summation in Table 1 can elegantly be called the epistemically weighted average of interests. There is a calculation associated with (2c) illustrating the formula. The subtotals emerge as follows. 5·5: the speaker is absolutely sure that they want the listener to leave; 3·4: the speaker finds that the listener probably has a strong desire to go home. Then the sum of subtotals should be divided by two, the number of those taken into account, as the speaker and the listener have been considered, and then also by five, as the scale of values rests upon fifths. The set *R* of those whose desire is taken into account, provided by the addresser profile proposed in an underspecified manner, serves as a key ingredient of the *D*-dimension in all the three specified variants of target-oriented mentalization. One might think that it offers too much freedom, but we claim that it will get specified just like pronouns such as *this* or *everyone* in real contexts. The speaker knows whose interest they intend to serve, and the listener should also make a reliable decision on this topic (2b-c).

It is also noteworthy that the eventuality  $e$  whose negative truth value is responsible for actuating the target-oriented mentalization does not necessarily coincide with the eventuality  $e'$  that the sum of interests discussed above concerns. Someone longing for another person to be in the middle of going home is almost nonsensical. What one longs for is that their guest either leave their flat or be at home. The typical  $e'$  is the result state (within the complex event structure) of action  $e$  (Farkas & Ohnmacht 2012). It is also typical that  $e'$  is an eventuality assumed to be associated with  $e$  in our lifelong mental network in the practically cognitive ReALIS framework. Lauer (2013) discusses interesting cases in his subsection 6.1.3. Suppose a doctor tells a patient that “take these pills for a week” ( $e$ ). They are likely to share the presupposition that both want the listener to be healthy ( $e'$  with  $R=\{i,u\}$ ). According to another script the doctor’s decision for pills is motivated by his desire for kickback ( $e'$  with  $R=\{i\}$ ). Viewing things from the listener’s perspective, their task in the course of accepting the addressee role contains the calculation of an ideal pair of  $e'$  and  $R$  for which the formula with summation yields a positive value, or straight the maximal value.

As for underspecified factors in intensional profiles, it is an important task of a discourse marker to specify certain variables in the intensional profile of the sentence that it is part of. The discourse markers presented in (3a,b) and (3a’) specify set  $R$  in a way that the corresponding imperative sentences will be such that the addressee’s and the addresser’s interest is served, respectively, at least in the speaker’s opinion. A highly simplified characterization of the vocal discourse markers in (3a-a’) is as follows. The “I don’t mind” meaning component is due to the lengthening of the first syllable of the verb stem on the left periphery of the sentence (3a). The “pretty please” meaning component is triggered by the lengthening of the last syllable of the preverb on the right periphery of the sentence (3a).

- (3) a. *Meeenj* haza! Mit bánom én!  $R=\{u\}$   
 go.Sbjv home what.Acc mind.1Sg I  
 ‘Go home! I don’t mind.’  
 a’. *Menj* hazaaa! Léci-léci!  $R=\{i\}$   
 go.Sbjv home please-please  
 ‘Go home! Pretty please.’  
 b. *Nyugodtan* vitasd meg az ügyet a férjeddal!  $R=\{u\}/?$   
 calmly discuss.Sbjv perf the case.Acc the husband.2Sg.Ins  
 b’. ‘Feel free to discuss the case with your husband.’  
 b”. ‘You should remain calm while discussing the case with your husband.’

*Nyugodtan* ‘calmly’ is a potential discourse marker, which may cause ambiguity in the sentence it occurs in, see (3b). As a discourse marker, it practically converts an imperative into a kind permission (3b’). On the other meaning, set  $R$  remains underspecified and the contribution of *nyugodtan* ‘calmly’ is indeed that of an adverb referring to calm manner. Now we do not intend to provide a formal analysis of these discourse markers; their role in this discussion is to contribute to the characterization of the matrix intensional profiles.

In the dimension of intentions (see Table 1),  $e$  itself plays the role  $e''$  in target-oriented mentalization ([I intend you to intend  $e''$ ]), or within its complex event structure, its preparatory phase does. In the case of (2a), for instance, the listener is instructed (to begin) to go home. As for authorities, the speaker must have authority over warranting the issue while the listener must be able to perform it. Both parts may be refused, as shown in (4a,b), in which the relevant

components of the resisting listener's thoughts are presented in **bold** as reactions to the corresponding criteria concerning authorities.

- (4) a. Nem parancsolhatsz nekem! iAiIuI+ → **uBiAiIuI+ε0**  
 not command.can.2Sg I.Dat  
 'You are not in a position to give me commands.'
- b. Ilyen részegen nem vagyok képes hazamenni. iBuA → **uBuAε0**  
 this drunkenly not be.1Sg able home.go.Inf  
 'I am not able to go home this drunk.'

### 3.3 Declarative profile

Being in the possession of a piece of information (e; see (5a))—by this we mean the state  $iBε+5$ —what can it be that a speaker may want to gain from a listener? Obviously, something should be changed. This may be the alteration of the external world—by which we would return to the imperative sentence type, with the negative form “eventuality e must not hold” (5a’). Or it may be the alteration of the listener’s mind, the straightforward mode of which is to enrich the listener’s information state with the fact that e is true.

The prerequisite for this latter action is as follows:  $uB≠+5$ , since something must be changed. Or more precisely, what the speaker is responsible for is that they more or less think so, indeed:  $iBuBε''+5•''0$ . If the speaker thinks that the listener is also aware of the truth of e, an adequate discourse marker should indicate this in order to create the appropriate addresser’s profile (5b).

- (5) a. Fanni vegán.  
 Fanni vegan  
 'Fanni is vegan.'
- a'. Fanni ne legyen vegán! A vegán étrend nem tartalmaz K2 vitamint.  
 Fanni not be.Sbjv vegan the vegan diet not contain K2 vitamin.Acc  
 'Fanni shouldn't go vegan. Vegan diets do not provide vitamin K2.'
- b. Fanni *ugye(bár)/tehát* vegán.  
 Fanni isn't she / thus vegan  
 'Fanni is [thus vegan] / [vegan, as is known].'
- b'. So we should treat her in the Green Elephant vegan restaurant.

What may render it legitimate, however, to tell one what one knows? Well, a good reason for doing so is to negotiate common knowledge in order to, say, base a proposal on it in the continuation of the conversation, as illustrated in (5b-b’).

What desire or interest may move the speaker opting for the declarative intensional profile? The series of examples presented in (6) suggests that it is worth, again, basing our approach on the subspecified profile of target-oriented mentalization in considering interlocutors’ roles and apply it to the target that the listener’s information state be enriched ( $iBrDuB+$ ). The speaker may serve their own interest by enlightening their colleagues with their commitment to veganism in order to avoid unpleasant invitations and presents (6a). It may also occur that someone intends to serve the interest of a friend who is about ready to court Fanni (6a’).

- (6) a. Vegán vagyok. ← R={i}  
 vegan be.1Sg  
 ‘I am vegan.’ ↓ R={u}
- a’. Fanni vegán. Csak hogy tudd, ha étterembe akard invitálni...  
 Fanni vegan only that know.Sbjv.2Sg if restaurant.Ill want.2Sg invite.Inf  
 ‘Fanni is vegan. So that you know in case you want to ask her out to a restaurant.’
- b. Aranka, ma este játszik a Chelsea. R=?  
 Aranka, today evening play the Chelsea  
 ‘Aranka, Chelsea is playing tonight.’
- b’. I hate football. R={u}/{i}/{i,u}
- b”. Thanks for the info, I’ll let him know. R={o}

The declarative sentence in (6b) may puzzle Aranka, who has been chosen to be the addressee, if she does not care about football. Should this be the case, it is hardly within her interest to be informed about the Chelsea game and she might not have a clear understanding of the speaker’s interest, either. Refusing the addressee role, as illustrated in (6b’), is a reasonable solution for her. An alternative “solution” is illustrated in (6b’): Aranka attempts to find a third person who may be interested in the transmission of information, and acknowledges that she could find the person in question, that is, she could appropriately specify addresser’s D type profile-element.

As can be seen in Table 1, there is a subtle difference in numerical characterization between intention and desire/interest. The interest in information transmission pertains to finding out the truth concerning *e*. The relevant value of  $\beta=iBrDuB_+$  is thus the set  $\{-5,+5\}$  of the two truth values (referred to as  $\pm 5$  in the table); the addressee’s authority also pertains to the “possession of” this knowledge:  $iBuAuB_+ \in \pm 5$  (“no secret to them”). What the addresser can intend to carry out, however, is to transmit their knowledge with  $iB_+=+5$  as the value  $iIuI+uB_+$ ; the question of addresser’s authority pertains to this value:  $iAiIuI+uB_+=+5$ . The two authority values are independent of each other, which can be exemplified as follows. A doctor’s patient is entitled to the information concerning the illness:  $iBuAuB_+=+5$ . If, however, the doctor happens to speak to the patient on the phone, they are not in a position to discuss certain details:  $iAiIuI+uB_+=0$ .

### 3.4 Interrogative profile

By using worldlet labels to characterize the declarative and the imperative profile, as given in Table 1, we are in a position to provide a compositional implementation of Searle’s (1969: 69) idea: The basic interrogative type is nothing else but asking the addressee, by an imperative profile, for enriching their, the addresser’s, information state with the truth value of an eventuality *e* by means of a declarative profile. All the formal details underlying the worldlet labels provided in Table 1 cannot be discussed but we are going to overview the crucial points.

Remember the point of departure for having recourse to the imperative profile is a shared “negative state”, which can be specified in the given case as follows:  $iB \notin \pm 5$  and  $iBuBiB \notin \pm 5$ . That is, it is considered that both interlocutors are aware of the addresser’s “unknown status”:  $\dots iB \in '0'$  (7a). The latter formula expresses that the addresser has no bias towards the would-be answer; otherwise (Gyuris 2008, Molnár 2016), the adequate formula is as follows:  $\dots iB \in '+4'$  (7b).

- (7) a. Fanni vegán?  
 Fanni vegan?  
 ‘Is Fanni vegan?’
- b. Fanni ugye vegán?  
 Fanni isn’t she vegan?  
 ‘Fanni is vegan, isn’t she?’
- c. Fanni vajon vegán?  
 Fanni VAJON vegan?  
 ‘I wonder if Fanni is vegan.’

Some kind of desire or interest and the explicit intention of the addresser pertain to the appropriate modification of the “negative status”:  $iBrDiB_{+e} \pm 5$ ,  $iIuI+iB_{+e} \pm 5$ , the addresser’s output information state should already contain the truth value of  $e$ . The same motive of  $iB_{+e} \pm 5$  appears in the compositionally calculated authority formulas as well:  $iAiIuI+iB_{+e} \pm 5$ , “I am sure that I am in a position to ask this question,” and  $iBuAiB_{+e} \pm 5$ . As for the latter formula, the crucial factor of the addressee’s required authority is that they are in possession of the given piece of information:  $iBuB_{+e} \pm 5$ . Note that in Hungarian there is a discourse marker which expresses that the speaker knows that the listener is unlikely to know the truth value of  $e$ . This “hesitative” discourse marker (Schirm 2011, Gyuris 2013) is exemplified in (7c). By using it, the speaker can undo a listener’s responsibility to answer them.

#### 4 How to Tell a Lie?

In the search of the conventionalized system of human communication—the roles assumed to be left to us by our ancestors—we should be aware of the fact that a speaker always has the freedom to act by speech in a way that is not in harmony with their mental status. This raises the following question. How can a rule system be revealed if interlocutors may any time act according to other rule systems.

We claim that language itself solves this paradox-like situation by providing thousands of expressions for capturing what  $\Re$ ALIS can formulate as a mismatch between two representations of the same type, that is, conventionalized roles of addressers and factual information (or mental) states of speakers. The emphasis is on “of the same type,” with distinguishing speaker from addresser (Oishi 2014, 2017; cf. Austin 1975): the peculiar ontology of  $\Re$ ALIS (Alberti & Kleiber 2012, 2014) makes it possible to capture, say, lying or bluffing, in a formal way in the trivial manner of comparing “what was said” to “what was thought in the meanwhile”. A brief comparison between three speaker profiles, presented in Table 2, will serve as an illustration of the issue. The profile of the ideal speaker comes from Table 1.

Ideal speaker opting for the declarative	Speaker bluffing in order to save face	Speaker telling a huge lie
$iB \in +5\alpha$	$'+4\alpha'$	$-5\alpha'$
$iBuB \in \alpha^{*='''0''}$	$'+5\bullet''0'$	$'+5\bullet''0'$
$iBrDuB \in \pm 5\beta$	$(iB)iDuB+iB \in +5\bullet-5\bullet\alpha'$	$(iB)iDuB \in +5\bullet\alpha$ $iBuDuB \in +5\bullet''+5\bullet\beta$
$iBuAuB \in \beta$	$'+5\bullet''+5\bullet\beta$	$'+5\bullet''+5\bullet\beta$
$iIuI+uB \in \alpha$	$iIuI+uB+iB \in +5\bullet+5\bullet-5\bullet\alpha'$	$'+5\bullet+5\bullet\alpha$
$iAiIuI+uB \in \alpha$	$'+5\bullet''+5\bullet+5\bullet\alpha$	$'+5\bullet''+5\bullet+5\bullet\alpha$

Table 2. Speakers with Different Mental States Opting for the Declarative Intensional Profile

Suppose Betti had been asked by her boss, who had to leave for a conference on speech acts, to participate in a meeting convened by the dean, but she accidentally forgot to do so. When the boss, having returned from the conference asked Betti to give an account of the meeting, she bluffed saying that “the dean spoke about the bad financial status of the faculty,” in order to prevent her boss from learning that she had missed the meeting. A face-saving bluffing like this is formulated in Table 2. It is to be regarded as a first step towards a would-be general systematization of ways of “creative use” of conventionalized intensional profiles (Goffman 1974: 83).

Let us consider the crucial elements of this mental description. The one who is bluffing does not know the truth ( $iB \notin \pm 5$ ), but, since it is within their interest to not be caught, is worth for them to consider  $e$  as more or less likely:  $iB \in '+4$ ; otherwise, they should bluff by saying the opposite of  $e$ . As for labels  $iBuB$ ,  $iBuAuB+$  and  $iAiIuI+uB+$ , they are different from the baseline in a way that captures that who tells a lie or a bluff is worth very reliably mentalizing the listener (“+5 intervals are replaced with narrower ‘+5 intervals), in order, again, to reduce the chance of getting caught. Finally, the one who is bluffing strives to serve their own interest ( $R=\{i\}$ ) and intends to act accordingly, with the relevant label segment as follows  $uB+iB \in -5\bullet iB$ : the listener must not learn the real value of the speaker’s knowledge on the truth value of  $e$ . Note that the bluffer is not to be assumed to intend the listener to store a potentially wrong truth value in  $uB+$ .

Those, however, who set out to tell a huge lie, know exactly that  $e$  is not true ( $iB \in -5$ ) but wants the listener to store the wrong truth value:  $iIuI+uB \in +5$ . As for the D-dimension, now  $iD$  and  $iBuD$  are not summarized but separated as follows:  $iDuB \in +5$ , “I long for your accepting that  $e$  is true,” and  $iBuDuB \in \pm 5$ , “I hope that you are an unsuspecting listener who is eager to learn the truth value of  $e$ .”

## 5 Summary

We intended to verify that  $\mathfrak{ReALIS}$ , in spite of its logics-based formal-semantics fundament, can serve as a “cognitively viable linguistic representation” (Andor 2011: 1). We intended to convince the reader that  $\mathfrak{ReALIS}$  is an exception to Searle’s pessimistic panorama on formal-semantics based theories (Andor 2011: 8–9), who declares that: “we won’t understand the aspects of language that interest me [Searle]: how it relates to human life, how it relates to society, how it relates to human interaction, unless you see its role in the actual performance of

speech acts by actual speakers”. In *ReALIS*, actual speakers are characterized by comparing conglomerates of truth values in two representations. One representation is that of possible worlds of beliefs, desires, authorities and intentions as conventionalized in language in the intensional profiles of major and other sentence types and discourse markers at the disposal of addressers. The other representation is that of possible worlds of speakers’ beliefs, desires, authorities and intentions as they are factually stored in their mental states and dynamically changing from state to state. The current paper concentrated on the formal description of the system built up of the three major sentences types in Hungarian and it sketched the profiles of speakers who tell huge lies and who bluff.

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