

FEEDBACK AND SITUATION THEORY

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1 Introduction

From the point of view of a linguist interested in the semantics of spoken language and human communication, one of the main attractions of situation theory and situation semantics is the fact that they can be applied to so many different aspects of language and communication. In contrast to most model-theoretic approaches to semantics (such as Montague Grammar), situation-theoretic framework allows us to extend the semantic analysis beyond the realm of propositions and declarative sentences, and to treat, within a single unified framework, many aspects of spoken language and communication which have hitherto been neglected in semantic theory. I have in mind, for example, such aspects as turn-taking, repair, and sequential organization of utterances in conversation, aspects which, until now, have mainly been studied under such headings as *discourse analysis*, *conversation analysis* and *text linguistics*.

In the present paper I want to discuss the application of situation theory to the study of face-to-face communication, focusing on one particular phenomenon which is typical of spoken language and face-to-face communication but which, to my knowledge, has never before been treated within the confines of model-theoretic semantics. The phenomenon I want to focus on is what Allwood (1988b, 1988a) calls *linguistic feedback*, i. e. "the regular linguistic (and in principle also kinesic) mechanisms whereby a speaker and a listener keep each other informed about the following four *basic communicative functions*: (i) maintenance of contact and interaction, (ii) perception, (iii) understanding, (iv) attitudinal reactions" (Allwood 1988a:3). As an illustration, consider the following transcript of a fragment of a face-to-face conversation between two Swedish university students, Gudrun and Kajsa, who are talking about a course in historical linguistics which Gudrun has already taken and which Kajsa is about to take. In this passage, Gudrun is telling Kajsa that, during the course, she had to draw up the historical development of a particular word on the blackboard.¹

(1)	GUDRUN:	...	<u>ja fick skriva på tavlan</u> då (0.2)	hur ett ord hade förändrats ²
	HANDS:	<R H SWEEP R >	<R H SWEEP R >	
	KAJSA:	mmm		
	HEAD:	<NOD>		

At one level of analysis, the communicative event in (1) can be analyzed as a simple statement by Gudrun. At a more fine-grained level, however, we find that this statement is realized through a whole sequence of smaller events involving both participants. First of all, we may note that Kajsa gives

¹ The transcript is organized as follows. Lines beginning with a person's name (GUDRUN or KAJSA) are speech lines containing an orthographic transcription of the words uttered by that person; underlining marks heavy stress, and numbers in parentheses indicate pause length in seconds. Shadowing in the speech line marks gaze aversion (see below section 2.4). The indented line immediately below a speech line contains information about hand gestures or head gestures, as indicated by the word HEAD or HAND occurring at the beginning of the line. Shadowing here indicates the extension of a gesture, the nature of which is specified in angle brackets (e. g. R H SWEEP R for "right hand sweep right", and NOD for "head nod").

² English translation of Gudrun's utterance: I had to write on the board you know (0.2) how a word had changed

feedback, by uttering the word *mmm* and nodding her head, in the middle of Gudrun's statement. And the occurrence of this feedback utterance is certainly not random. On the contrary, I want to argue that Gudrun, in the first part of her utterance, *elicits feedback* from her auditor.

In the present paper I will try to do three things. First, I will show how a communicative situation like (1) can be represented in a situation-theoretic framework. Second, I will discuss different flows of information in such a situation (with special reference to feedback processes). Third, I will discuss how these flows of information can be explained in terms of (conditional) constraints on communicative situations. The main purpose of the paper is not to present a descriptively adequate account of linguistic feedback in face-to-face communication, but to illustrate, in a principled way, how situation theory can be used in the study of human communication.

2 Representing Communicative Situations

In this section I will build up the necessary apparatus for representing situations of face-to-face communication within a situation-theoretic framework. I will mainly use the notation and terminology of Barwise & Perry (1983), because it is the most perspicuous notation I know of for representing dynamic situations of the sort we are interested in here (i. e. *events* and *courses of events*), especially when we are dealing with large situations (i.e. situations supporting a large number of facts). I will also introduce a slight modification to make the notation even more perspicuous.

The interpretation of the notation, however, will be more in line with recent developments in situation theory and situation semantics (notably, the more recent articles in Barwise 1989). Thus, I will say, for example, that a course of events supports (rather than *consists of*) a set of *located facts* of the following form: $\langle \text{at } l: r, a_1, \dots, a_n; i \rangle$, where l is a spatiotemporal location, r is a relation, a_1, \dots, a_n is an argument sequence appropriate for r , and i is a polarity.

Face-to-face communication is multi-channel communication so in representing communicative situations we must be able to represent facts about agents being involved in different kinds of communicative behavior along different communication channels. In this paper, I will restrict my attention to four kinds of communicative behavior: *speech*, *hand gestures*, *head gestures*, and *gaze*.

2.1 Speech

Following Barwise & Perry (1983), I will assume that a communicative situation may support facts about who is speaking and what the speaker is saying. In order to represent such facts, Barwise and Perry assume a one-place relation **speaking** (holding of speakers) and a two-place relation **saying** (holding between speakers and the expressions they utter). For example, the course of event (1) can be partially characterized in the following way:

- (2) in e : at l_1 : speaking, gudrun; 1
saying, gudrun, *I had to write on the*; 1
speaking, karin; 0

I assume that there is a structural constraint on (communicative) situations to the effect that if a situation s supports the fact $\langle \text{at } l: \text{speaking}, a; 0 \rangle$ for some location l and individual a , then s does not support $\langle \text{at } l: \text{saying}, a, \alpha; 1 \rangle$ for any expression α , and if s supports $\langle \text{at } l: \text{saying}, a, \alpha; 1 \rangle$ for some location l , individual a , and expression α , then s does not support $\langle \text{at } l: \text{speaking}, a; 0 \rangle$.

2.2 Hand gestures

Hand gestures of different kinds constitute an important means of communication in face-to-face communication (cf. Kendon.1986). In the present context, however, I am interested in hand gestures primarily as an indication of the speaker role (cf. Duncan 1973). Therefore, I will not distinguish between different kinds of gesture, but simply assume a relation **gesticulating**, which holds of an agent who is engaged in hand gesticulation. For example, the following is another partial characterization of the course of event (1):

- (3) in e : at l_1 : gesticulating, gudrun; 1

2.3 Head gestures

Head gestures, notably nods and shakes, are important as feedback signals in face-to-face communication. I will therefore assume three one-place relations: **nodding**, **shaking**, and **moving head**, with the following structural constraints:

- (i) if a situation s supports the fact $\langle \text{at } l: \text{nodding}, a \ 1 \rangle$ for some location l and agent a , then s does not support $\langle \text{at } l: \text{shaking}, a; 1 \rangle$, nor does it support $\langle \text{at } l: \text{moving head}, a; 0 \rangle$;
- (ii) if a situation s supports the fact $\langle \text{at } l: \text{shaking}, a; 1 \rangle$ for some location l and agent a , then s does not support $\langle \text{at } l: \text{nodding}, a; 1 \rangle$, nor does it support $\langle \text{at } l: \text{moving head}, a; 0 \rangle$;
- (iii) if a situation s supports the fact $\langle \text{at } l: \text{moving head}, a; 0 \rangle$ for some location l and agent a then s supports neither $\langle \text{at } l: \text{nodding}, a; 1 \rangle$ nor $\langle \text{at } l: \text{shaking}, a; 1 \rangle$.

2.4 Gaze

The term *gaze* is used in the literature to refer to a person's looking behavior, which is known to have an important regulatory function in face-to-face communication (cf. Argyle & Cook 1976). For dyadic conversations like the one illustrated in (1), we can get by with a rough two-way distinction between looking and not looking at the other participant. For reasons that will become apparent later, I will take **averting gaze** (i. e. not looking at the other participant) as the basic relation here. Thus, we may add the following to our partial characterization of (1):

- (4) in e : at l_1 : averting gaze, gudrun; 1

2.5 Representing Communicative Situations - An Example

The communicative situation represented in transcript form in (1) can now be represented in situation-theoretic terms as in (5).

Two comments are in order here. The first concerns the notation, which differs from that of Barwise & Perry (1983) in one respect. To enhance perspicuity, I have used indentation to indicate that the location of a fact (or set of facts) is *temporally included* in the location of the preceding fact (or set of facts). Thus, for example, the locations l_3 and l_4 are both temporally included in the location l_2 .

The second comment concerns the problem of knowing what to include in the representation. For example, should the fact that Karin (the auditor) is not speaking (except at l_2) be present at every location? The principle I have adopted here is to include on the one hand all positive facts, and on the other hand all *changes* from positive to negative facts or from negative to positive facts, but this is certainly a principle that could be debated.

- (5) e := at l_1 : gesticulating, gudrun; 1
 averting gaze, gudrun; 1
 saying, gudrun, *I had to write on the*; 1
- at l_2 : gesticulating, gudrun; 0
 averting gaze, gudrun; 0
 at l_3 : saying, gudrun, *board you know*; 1
 at l_4 : speaking, gudrun; 0
 saying, kajsa, *mmm*; J
 nodding, kajsa; 1
- at l_5 : gesticulating, gudrun; 1
 averting gaze, gudrun; 1
 saying, gudrun, *how a word*; 1
- at l_6 : averting gaze, gudrun; 0
 at l_7 : saying, gudrun, *had*; 1
 at l_8 : gesticulating, gudrun; 0
 saying, gudrun, *changed* 1

$(l_1 < l_2 < l_5 < l_6)$
 $(l_3, l_4 \subseteq_t l_2)$
 $(l_3 < l_4)$
 $(l_7, l_8 \subseteq_t l_6)$
 $(l_7 < l_8)$

3 Flows of Information

In this section I want to consider different information flows (with special reference to *feedback*) in the communicative course of event *e* in (5). In order to do this, it will be convenient to divide the situation into three major subevents (or subcourses of events), the first of which is represented in (6) as the event e_1 .

This event can be regarded as a (complex) communicative act performed by Gudrun, which allows Kajsa to pick up at least two different kinds of information. First, there is the propositional information carried by Gudrun's utterance *I had to write on the board you know*, i. e. what Barwise (1989) calls the *primary* content of the utterance. But there is also another kind of information which is carried by e_1 , namely the information that Gudrun wants Kajsa to acknowledge her utterance, i. e. to signal whether she has heard the utterance, understood it, and accepted it as a contribution to the conversation. In other words, the event e_1 combines the transfer of propositional information with *feedback elicitation* (Allwood 1988b, 1988a).

(6) e_1 := at l_1 : gesticulating, gudrun; 1
 averting gaze, gudrun; 1
 saying, gudrun, *I had to write on the*; 1
 at l_2 : gesticulating, gudrun; 0
 averting gaze, gudrun; 0
 at by l_3 : saying, gudrun, board you know; 1

There are two features of the event e_1 , which are crucial for the feedback eliciting function. The first is the change from gaze aversion to mutual gaze which occurs at l_2 . The second is the completion of the clause *I had to write on the board you know* (with a prosodic marker) which occurs at l_3 .³ In addition, we may note that the completion of the clause involves, on the one hand, a strong prosodic marker (heavy stress on board) and, on other hand, a tag particle (originally the Swedish word *då*, which literally means "then" but which is better translated here as "you know"), which often seems to combine the function of a boundary marker with that of a feedback eliciting signal.

(7) e_2 := at l_4 : speaking, gudrun; 0
 saying, kajsa, *mmm*; 1
 nodding, kajsa; 1

The second event e_2 , which is represented in (7), is a communicative act performed by Kajsa in response to the preceding utterance and feedback elicitation from Gudrun. This event carries three kinds of information, which can be described as backward-looking, present-looking, and forward-looking, respectively (CL Barwise & Perry 1983). First, it carries the (backward-looking) information that Kajsa has recognized the feedback elicitation from Gudrun (cf. event e_1). Secondly, it carries the (present-looking) information that Kajsa acknowledges Gudrun's preceding utterance (i. e. that she has heard, understood, and accepted the utterance). Thirdly and finally, it carries the (forward looking) information that Kajsa wants Gudrun to go on talking (or, at least, does not want to interrupt her).

³ It is not clear whether the relevant notion of "clause" here is "grammatical clause" (as argued by Duncan 1975) or "phonemic clause" (as suggested by Dittman & Unwell 1967). There is also the possibility that either will do, or that the two must coincide (as in fact they do in e_1).

The first two pieces of information can be explained from the fact that the word *mmm* accompanied by a head nod (or vice versa) is a conventional feedback signal in a context of this type. To explain the third piece of information, we have to consider also the absence of any (turn-claiming) speaker signals (e. g. audible inhalation, gesticulation, gaze aversion) on the part of Kajsa.

- (8) e_3 : = at l_5 : gesticulating, gudrun; 1
 averting gaze, gudrun; 1
 saying, gudrun, *how a word*;
 1 at l_6 : averting gaze, gudrun; 0
 at l_7 : saying, gudrun, *had*; 1
 at l_8 : gesticulating, gudrun; 0
 saying, gudrun, *changed* 1

The third event e_3 , which is represented in (8), is a communicative act by Gudrun of roughly the same kind as e_1 above (and, as far as the propositional content is concerned, a continuation of the latter). Besides the propositional content of the utterance *how a word had changed*, the event carries three kinds of information. First, it carries the (backward-looking) information that Gudrun has recognized Kajsa's acknowledgement of Gudrun's preceding utterance. (If she had not, she would almost certainly have initiated a repair or pursued a further response at this point.) Secondly, its initial part carries the (present-looking) information that Gudrun wants to continue speaking (in virtue of the gaze aversion and gesticulation at l_5). Thirdly, it carries the (forward-looking) information that Kajsa should acknowledge the utterance (in virtue of the change from gaze aversion to mutual gaze and the completion of a clause; cf. e_1 above).

4 Constraints

In this section I want to discuss how the flows of information treated in the last section can be explained in terms of (conditional) constraints on (communicative) situations, constraints to which the participants of a conversation, as members of a linguistic community, are attuned.

I will assume that the events e_1 , e_2 and e_3 (which are subevents of the course of events e) represent three different *event-types*, each of which is involved in a different set of (conditional) constraints. We may call these event-types *feedback elicitation* (cf. e_1 and e_3), *feedback giving* (cf. e_2) and *feedback follow-up* (cf. e_3). In the following discussion I will restrict my attention to the first of these event-types, i. e. feedback elicitation.

The event-type feedback elicitation can be tentatively defined in the following way (using uppercase italics as indeterminates):

- (11) E_1 : = at L_1 : speaking, X; 1
 addressing, X, Y; 1
 averting gaze, X; 1
 at L_2 : speaking, X; 1
 addressing, X, Y; 1
 averting gaze, X; 0
 averting gaze, Y; 0
 at L_3 : completing clause, X; 1

 ($L_1 < L_2 < L_3$)

Now what information does an event of this type generally carry? I want to suggest that it carries the information that in a short while (i.e. at near future location), the speaker will make a pause, maintaining mutual gaze, and expecting the auditor to give feedback. In other words, an event of type E_1 generally involves an event of the following type (where the location L_4 is related to the locations of E_1 in the appropriate way):

- (12) E_2 : = at L_4 : speaking, X ; 0
 averting gaze, X ; 0
 expecting FB from, X , Y ; 1

In other words, I assume that there is a constraint C_1 to the effect that E_1 involves E_2 . It is in virtue of this constraint that the event e_1 (and also the event e_2) carries the information that the current speaker (Gudrun) is expecting feedback from the auditor (Kajsa). And it is in virtue of being attuned to this constraint that Kajsa is able to pick up this piece of information.

In a similar fashion, we can define the event-types *feedback giving* and *feedback follow-up* and spell out the constraints that allow events of these types to carry the information that they do. I will not do that here, however.

5 Conclusion

In this paper, I have tried to show how situation theory can be applied to the study of face-to-face communication. I hope I have succeeded at least in making plausible that such a study, comprising a broader class of phenomena than that which has traditionally been studied in model-theoretic semantics, can ultimately result in a unified situation-theoretic model of linguistic communication. I also hope that the study of linguistic feedback that I am currently engaged in myself may have something to contribute to that development.

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