DISCUSSIONS AND EXPOSITIONS

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CONVENTIONS OF LANGUAGE AND INTENSIONAL SEMANTICS

(Translated by A. HURKMANS)

The article gives a critical exposition and discussion of central notions in Lewis' book "Convention". It emphasizes its importance for the theory of meaning.

In his book "Convention" (1969)—hereafter referred to as "C"—David Lewis put forward the first systematic analysis of conventions of language. The question "What is a convention of language" is already by itself of great interest because we find that in works on linguistics and even more so in works on the philosophy of language this word "convention" turns up in important places of the argument. Again and again we come across the claim that rules of language are conventional, or that the meaning of linguistic expressions is conventional. But what does this mean? For evidently not all stipulations in our language can be based on conventions in the sense of explicit agreements about our language; this would clearly land us in an infinite regress. If conventions of language then do not originate by such explicit agreements, what can they be said to be and how do they function?

The analysis of this question in Lewis' book, however, leads far beyond this initial problem. And that is why one can say that what is presented to us in that book are the new and fruitful beginnings of a general theory of meaning. I don't consider it an exaggeration to say that this theory represents an equally definite improvement on the *speech-act-theory* (as developed by J. L. Austin and J. R. Searle especially), as the latter theory was an advance on the *theory of meaning-as-use* (in the sense, say, of Wittgenstein's Philosophical Investigations), which for its part brought us an again decisive improvement on realistic semantics.[1]

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1 For the last three of the theories of meaning mentioned here, see e.g. Kutschera (71).

It is amazing then that since "C" was published Lewis's ideas have met with such a small response in the literature. For this reason, I would like to show in this essay—in the form of a critical exposition and discussion of Lewis's ideas—what seems to me important in them and what I see as the value of them for the theory of meaning.

The following discussion is divided into three parts: first the concept of a convention will be characterized generally, both intuitively and formally. Then conventions for individual signs will be discussed and it will be shown how their meaning results from the nature of the conventions in question. In the third part conventions for languages will be dealt with, first on the basis of a model of logical grammar, the presuppositions of which will then be investigated philosophically.

1. Conventions

1.1. *Intuitive characterization*

The first task in an analysis of conventions of language is to explain in general terms the notion of a convention and to show which function conventions have, how they come about and how they are stabilised.

Examples of conventions are:

a) Driving in the right lane in traffic.[2]
b) Saying "Good morning" as a morning greeting.
c) Meeting each other in the pub on Friday nights to play cards.

We can say first of all:

1) A convention is a regularity in the behaviour of the members of a group P.

A regularity in behaviour can consist in the fact that in situations of a particular kind always such and such is done, or more generally that a particular strategy is adhered to in which to different types of situations different action-procedures correspond. This stipulation (1) must now be restricted further:

2) Talk of "conventions" implies that involuntary, instinctive ways of behaviour are excluded. Words like "actions" and "action-procedures" in the usual sense always characterize a free, purposeful and intentional behaviour. Consequently, we will, when talking about conventions, speak of "regularities in actions" instead of "regularities of behaviour".

3) Speaking of a "convention" further implies that the goal of the action-procedure in question could be achieved in a different way: it is usual to act in that way and one does achieve by it the goal that was intended, but it could in

[2] The statutory norm which tells us to drive on the right can be seen as a subsequent codification of the convention, but we want to ignore this aspect for the moment. See section 1.5.

principle be done differently. That is, any action-procedure to which one is committed from the nature of the case as the only possible procedure to follow, is not conventional.

One frequently speaks of conventions when only conditions (1)—(3) are fulfilled, i.e., when something is usually done which could have been done differently. In this sense one could, for example, call "conventional" the fact that tea is drunk from shallow cups or that at dinner the fork is held in the left hand.[3] A more interesting and stricter notion of a convention is obtained, however, if we follow Lewis and add one further stipulation:

4) We can say that there is a conventional action-procedure only where the success of the action depends for everyone on the others acting likewise.

Going back to our earlier examples:

a) We want to avoid collisions by driving in the right lane. This is succesful only if everyone else drives in the right lane too.

b) I can greet someone with a "Good morning" only if he understands me. He understands me because it is quite common to greet one another in the morning with a "Good morning".

c) One comes to the card-game only if one's friends meet at a particular time in a particular place.

We must ask ourselves now how these intuitive elucidations of the notion of a convention can be made precise. As regards this, Lewis has made a suggestion according to which,—falling back on a game-theoretical model, one can formulate stipulations (3) and (4) exactly. Since (3) implies (2) one obtains in this way a useful explication of the notion of 'convention'.

1.2. Coordination problem.

In a situation S let actions from the set $\{f_{i1}, \ldots, f_{im_i}\}$, where $m_i \geq 2$, be open to n agents X_i, where $i = 1, \ldots, n$ and $n \geq 2$. By redefining the actions we can obtain that the *same* actions are open to all agents: let $m = \max m_i$ and $f_{im_i+r} = f_{im_i}$, where $r = 1, \ldots, m - m_i$. f(y) says that agent y performs action f. We define:

$$f_1(y) =_{Df} y = X_1 \wedge f_{11}(y) \vee y = X_2 \wedge f_{21}(y) \vee \ldots \vee y = X_n \wedge f_{n1}(y)$$
$$f_2(y) =_{Df} y = X_1 \wedge f_{12}(y) \vee y = X_2 \wedge f_{22}(y) \vee \ldots \vee y = X_n \wedge f_{n2}(y)$$
$$\vdots$$
$$f_m(y) =_{Df} y = X_1 \wedge f_{1m}(y) \vee y = X_2 \wedge f_{2m}(y) \vee \ldots \vee y = X_n \wedge f_{nm}(y)$$

Every agent X_i in S will then have the choice from actions $f_1, \ldots, f_m$. This will be assumed in what follows. If the X_i's in S do the same in the sense of f_j, where $j = 1, \ldots, m$, they can do differently in the sense of f_{iq_i}, where $q_i = 1, \ldots, m_i$. They can, for example, play different parts in one and the same play: one will play

[3] This last example comes from S. Schiffer who in (72) p. 152 classifies behaviour like this as conventional; he accordingly considers Lewis's notion of a convention too strict.

Polonius, another Ophelia, a third Rosencrantz; but they will all be playing "Hamlet".

Let R be the set of possible results of the actions of all X_i's. One can describe R either as set of n-tuples $\langle f_{j_1}, \ldots, f_{j_n} \rangle$, where $j_i = 1, \ldots, m$, so that there are m^n results. Or one defines a function r(x) over this set of n-tuples, so that R is then the value-domain and different n-tuples can have the same result. Let a payoff function u_i be defined over R for all i. Because we are only concerned in what follows with the payoff values we define R as in the first suggestion.[4]

For $x \in R$ we stipulate:

$(x)_i =_{Df}$ the i-th member of x

$x \overset{-}{\underset{i}{=}} y =_{Df}$ x and y agree to at most the i-th member

$x \underset{i}{=} y =_{Df}$ x and y agree to exactly the i-th member

$x/^{f}_{i} =_{Df} \iota y(y \overset{-}{\underset{i}{=}} x \wedge (y)_i = f)$.

For what follows we give once again the ranges of definition of the variables and indices:

$i, k \in \{1, \ldots, n\}$; $j, l \in \{1, \ldots, m\}$; $x, y, z \in R$; $f, g, \in \{f_1, \ldots, f_m\}$

We define:

D1.2–1: $CE(x) =_{Df} \bigwedge iky(y \overset{-}{=} x \supset u_i(y) < u_i(x))$ — x is a *coordination equilibrium.* If CE(x) obtains then every agent X_i prefers the situation in which all agents (including X_i) act as in x, to all situations in which exactly one agent (X_i or anyone else) acts differently. A CE x is a relatively stable state: as long as the others act as they do in by x it is best for everyone to act likewise.

D1.2–2: A *coordination problem in a wider sense* presents itself if and only if the following conditions (1)—(3) are fulfilled.

1) $\bigwedge if \bigvee x(u_i(x)/f) < u_i(x))$.

I.e., no agent X_i has a *dominant* action f which in every case, no matter what the others do, is best for X_i. In other words, every agent is presented with a real game-situation in which the success of his action depends on what the others do, so that it is appropriate for him to conform to the actions of the others.[5]

2) $\bigwedge xyi(CE(x) \wedge CE(y) \supset u_i(y) < u_i(x))$.

I.e., CE's are the best solutions to all the agents.

3) $\bigvee x CE(x)$.

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5 If R* is defined as in the second suggestion one obtains payoff-functions u_i^* over R* through $u_i^*(r(x)) = u_i(x)$; conversely, one can also define u_i from u_i^*. If a function r which identifies results is defined over R then it must hold that $r(x) = r(y) \supset u_i(x) = u_i(y)$.

5 If there is a dominant action f for an agent X_i then X_i, being a rational agent, will do f. One can then leave X_i out of further consideration and restrict oneself to the other agents for whom no action is marked out as dominant.

There are CE's; that is, there are results which are the relatively best ones for all parties concerned. Therefore all have the same interests, at least to the extent that they have an interest in cooperation. A CE is in this sense a solution of a coordination problem, i.e., a relatively optimum result for all.

D1.2–3: A *coordination problem in a stricter sense* presents itself if, in addition, condition (4) is fulfilled.

4) $\bigwedge x \bigvee y(y \neq x \wedge \bigwedge i(u_i(x) = u_i(y)) \vee \bigvee i(u_i(x) < u_i(y)))$.

There is no solution x of the coordination problem which is the best one for all agents X_i. That is, there are no combinations of actions which have primacy over other combinations of actions just because of the preferences of the participants. So either there are several solutions which are optimum for all agents concerned, between which they will have to decide jointly, or there is no solution at all which is optimum for all, so that they will have to agree on some CE as a compromise.[6]

For n = 2, coordination problems can be represented by matrices. Agent X_1 chooses by his action the column, X_2 chooses the row. The squares then represent the results x, the upper right indices represent the payoff values $u_1(x)$ and the lower left indices the values $u_2(x)$.

	f_1	f_2	f_3	f_4
f_1	0 0	1 0	2 1	1 0
f_2	1 1	3 4	1 0	1 1
f_3	0 2	1 1	1 2	0 1
f_4	1 0	0 0	0 1	4 3

Here we have a coordination problem in the stricter sense: there are no dominant actions. The CE's are (2,2) and (4,4). These CE's have for both the agents higher payoff values than all the other results. And there is no result which for all the agents is better than all the others.

The definitions in Lewis differ from the ones given here in a few points. From (2), (3) and (4) follows

5) $\bigvee xy(CE(x) \wedge CE(y) \wedge x \neq y;$

6 It wouldn't be sufficient just to require that $\bigwedge x \bigvee yi(y \neq x \wedge u_i(y) \geq u_i(x))$. Because if there are two CE's x and y such that for all X_i, where $i \neq k$, x is better than all the other results, while for X_k there is yet another, equally good solution, x would still be marked out: x is still the best solution for X_k and he has no grounds to prefer y to x as long as x is better than y for all the others.

that is, there are at least two CE's, which is what Lewis demands. From (5) follows (3).
If one demands with Lewis further on

6) $\bigwedge xik(u_i(x) = u_k(x))$,

that is, coincidence of interests, then (1) follows from (5) but not (2).

That is shown by the following matrix

	f_1	f_2	f_3	f_4
f_1	2 / 2	1 / 1	0 / 0	1 / 1
f_2	0 / 0	2 / 2	1 / 1	0 / 0
f_3	1 / 1	0 / 0	1 / 1	3 / 3
f_4	0 / 0	1 / 1	0 / 0	3 / 3

Here (1,1) and (2,2) are CE's, but (4,3) and (4,4) are not CE's and yet are still better than (1,1) and (2,2). However, (4,3) and (4,4) represent in any case *coordination equilibriums in the wider sense,*—for which we will write CE*, which we define as follows:

$CE^*(x) =_{Df} \bigwedge iky(y_k = x \supset u_i(y) \leq u_i(x))$.

Such CE's are relatively stable states to the extent that no agent has an interest in just one agent acting differently. But even if we substitute CE by CE*, (5) and (6) will not yield (2), as is shown in the following matrix:

	f_1	f_2	f_3
f_1	1,5 / 1,5	1 / 1	0 / 0
f_2	0 / 0	3 / 3	2 / 2
f_3	1 / 1	0 / 0	1 / 1

Here (1,1) and (2,2) are CE's and hence CE*'s too. (2,3) is not a CE*, and yet is still better than (1,1).

But (5) and (6) don't yield (4) either. In this matrix

	f_1	f_2
f_1	2 / 2	1 / 1
f_2	1 / 1	3 / 3

(1,1) and (2,2) are CE's, but (2,2) is evidently the best solution for both the agents.

(4) is therefore necessary to guarantee that there is no solution which is unequivocally preferred by all; to guarantee, in other words, that behaviour which is determined purely by the matter in hand is not classified, as it is in Lewis, as "conventional" in the sense of the definition given below in section 1.4.

One could of course say: if 999 agents prefer CE x to CE y and only one agent X_i prefers y to x then x has primacy over y because in that situation it is rational for X_i to bow to the preferences of the many others. It is indeed possible to allow for such factors too, but that would make the exposition more complicated; and it is already based on a very considerable idealization. For example, one could also speak of a CE if the great majority of those concerned prefers the great majority of the others not to act differently etc. However, for the purposes of a preliminary sketch, the simple conceptualizations which were introduced above will suffice. In any case, one will have to take into account in some way or other the fact that we speak of a convention only if it could equally well be done differently. And the agreement in our example of the 1000 agents demands in any case a compromise from X_i, that is, an action which is not marked out as the best one just because of his preferences. We can also imagine cases in which it makes sense for 999 agents to conform to one pigheaded egoist. Other considerations than just the valuations of the results come in here. But we have only spoken of the latter thus far.

One can also redefine f_j in such a way that, as Lewis presupposes, $CE(x) \supset \bigwedge ik((x)_i = (x)_k)$; that, in other words, CE's come about only if all do the "same" in an appropriate sense. For the sake of simplicity we will assume that in what follows.

For a coordination problem to exist, it is not required that the participants act simultaneously. The problem will only be restricted if one agent already knows how some other agents have acted. But if he does not possess any such information it is quite indifferent whether he acts simultaneously or later than the others.

Instead of momentary acts, the $f \in \{f_1, \ldots, f_m\}$ can also be *strategies* in situations T_q ($q \in Q$, where Q is a set of indices), strategies to perform actions $h \in$ „$h_1, \ldots, h_p$" f is then a function f(q) with the value-range „$h_1, \ldots, h_p$". The agents will now ascribe a payoff to the n-tuples of strategies as results.

We also have a coordination of strategies if the agents X_i act jointly in every situation T_q and there exists a coordination problem in every T_q. Every agent is then concerned with the development of a strategy f_j so that $\langle f_{j_1}, \ldots, f_{j_n} \rangle q = \langle f_{j_1}(q), \ldots, f_{j_n}(q)) \rangle$ represents a CE for every q. The payoff-values $u_i(x_q)$ can also depend on the q. In that case the payoff-values of the n-tuples of strategies x will be determined by the payoff-values of the x_q's.

1.3. Solving coordination problems.

If agent X_i, faced with a coordination problem in the stricter sense, acts rationally, he will choose an action f for which the utility, that is, the expected payoff-value $U_i(f) = \sum_{x:(x)_i f} u_i(x) . w_{if(x)}$, is maximum. $w_{if}(x)$ is here the subjective probability which X_i assigns to the result x if he does f himself (the probability, in other words, that X_1 will do $(x)_1$, X_2 $(x)_2$, etc.).

If every agent X_i acts rationally in situation S and if all he knows are the payoff-functions of the others and that they act rationally too and don't have any more information than he himself has, then X_i cannot meaningfully calculate probability-valuations w_{if}. For the probability that another agent X_k does g depends on the value $U_k(g)$, the latter on the value w_{kg} whenever X_i does f; and that value again depends on $U_i(f)$ etc. There will be no purely rational solution in any coordination problem, when we have this network of dependences.

Such problems must therefore be solved in a different way: the participants will come to an explicit agreement, or they will remind themselves of past cases of the same kind which accidentally turned out to be succesful, or they will draw analogies with similar cases etc. Past successes will play a special role where arrangements cannot be made. To take up an example of Lewis's: if one wants to meet with a friend and has arranged the time but not the place of meeting and any contact on this matter is ruled out, one is inclined,—in the absence of other criteria—, to choose the place where one last met.

Past successes, therefore, stabilise a solution of a coordination problem in the stricter sense; and if all participants in the past proceeded as in one particular solution then one can readily assume that, in similar circumstances, they will proceed in the same way in the future. But if I expect that all the others will act in a particular way then it is rational for me to act in that way too, because that way I obtain the relatively best solution for myself in the form of a coordination equilibrium.

1.4. Conventions as solutions of coordination problems.

We can now give a definition like the one in Lewis (C, 42):

D1.4–1: A regularity f in the actions of members of a group P who are agents in a recurrent situation S is a *convention* if and only if in all circumstances of S:

a) everyone does f
b) everyone expects everyone else to do f.
c) there is a coordination problem in the stricter sense and if all do f the outcome will be a coordination equilibrium.

In this definition we have taken into account conditions (1) to (4) of section 1.1. We are dealing with intentional actions, the success of which for each

agent depends on the others acting likewise. Acting in common in the sense of f leads to success, but there would be other ways of achieving success too. This is part of the notion of a coordination problem in the stricter sense (cfr. condition (4)).

Because everyone expects the other participants to do f and because doing f jointly will result in a CE, it is rational for each agent to do f himself.

D1.4–1 comprises the case in which every S-situation presents its own particular coordination problem in the stricter sense, particularly when several agents take part. We can also understand the notion of a convention in a more general sense, viz., in the sense of the generalization (as given in 1.2) of coordination problems into strategies. Let X be an agent, $\mathfrak{S}$ a set of (disjunct) states (situations), $\mathfrak{H}$ a set of action-procedures[7], and $\mathfrak{G}^{(\ )}$ the set of all functions that map subsets of $\mathfrak{S}$ into $\mathfrak{G}$.

We define:

D1.4–2: A *strategy* of X in respect of $\mathfrak{S}$ and $\mathfrak{H}$ is a function c from $\mathfrak{H}^{(\ )}$ such that c(S) indicates for all $\mathfrak{H} \in \mathfrak{S}$ for which this value is defined, the action-procedure h from $\mathfrak{H}$ which X carries out in situation S.

If $\mathfrak{S}$ is the set of all situations we will only speak of a strategy in respect of $\mathfrak{H}$.

D1.4–3: A strategy of X in respect of $\mathfrak{S}$ and f is a strategy in respect of $\mathfrak{S}$ and $\{f, \neg f\}$.

D1.4–4: A *joint strategy* of the members of a group P (or "in P") in respect of $\mathfrak{S}$ and $\mathfrak{H}$ is a function c such that c is a strategy for all $X \in P$ in respect of $\mathfrak{S}$ and $\mathfrak{H}$.

D1.4–5: A joint strategy c in P is a *convention* in P if and only if:

a) Every member of P expects every other member to act according to c.

b) The joint action of the members of P solves for them a coordination problem in the stricter sense (i.e., the outcome is a CE).

A case which is covered by D1.4–5, but not by D1.4–1, is the following: the members of P want to economically use the petrol supply which they have at their joint disposal; to this purpose, they agree not to drive faster than 100 km/h. Here we don't have recurring situations that present their own respective coordination problems.

Lewis suggested in C various modifications of D1.4–1:

1. He demands first of all that a convention in the sense of D1.4–1 must also be known as such in P, that it must be *common knowledge* among the members of P that conditions (a), (b) and (c) of D1.4–1 obtain. Suppose someone drives on the right because he wants to prevent collisions and suppose that he expects

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7 $\mathfrak{S}$ may also contain the "empty" action: to do nothing (not to become active).

everyone else to drive on the right, but without assuming that they also expect everyone else to drive on the right, or that they also have an interest in preventing collisions, then he would quite falsely assume that they were behaving irrationally (C, 59).

But it is not altogether necessary to exclude such cases generally. Even if the members of P don't believe that strategy c is a convention in P (in other words don't believe that the others have an interest in conforming to c when they themselves do, or don't believe that the others will expect that they themselves expect the others to follow c), even then one can still speak of a convention. The facts, especially the actions, remain the same; the coordination works. Besides, the actions remain significant, inasmuch as everyone expects everyone else to conform to c, it will make sense for each agent to conform to c because it is in his interest to do so. The only difference is that members of P may possibly (falsely) look upon actions of the others as senseless or irrational from the standpoint of the others (i.e., from their expectations and interests).

As a rule, however, the expectations demanded in D1.4–1 and D1.4–5 respectively will be based on the assumption that it is common knowledge in P that strategy c represents a convention, that, in other words, it makes sense for the others to conform to c[8]. Moreover, it is important in the case of some conventions, especially conventions of communication, that the actions of the others which are in conformity with c are recognised as meaningful. One will then appeal to a *stricter notion of a convention* than the one in D1.4–5 and define:

D1.4–6: A strategy c is a *convention* (in the stricter sense) in P if and only if all members of P know that:

a) c is a common strategy in P
b) joint action of the members of P which conforms to c solves a particular coordination problem in the stricter sense.

Unless indicated otherwise we will in what follows always understand conventions in the stricter sense of D1.4–6.

The explanation of the concept *common knowledge* in Lewis (C, II. 1) is unclear and to make it more precise can then to appeal to an epistemic logic. It can then be seen that it is sufficient to demand a common knowledge of the members of P in sense of D1.4–6.[9]

[8] We must bear in mind that expectations about the actions of others by no means always presuppose that these others are acting on rational considerations. In particular, their actions may simply follow habit and explicit considerations may not come into it at all. An action by X can make sense, that is, can be useful to X and not have been planned rationally by X.

[9] The term "common knowledge" plays a prominent part in Lewis's discussion; he introduces it on p. 52ff. In order to make this particular concept more precise and to reconstruct the arguments in which it is used we refer to the system of epistemic logic which

is put forward in Kutschera (75a), Chapter 4. Let "G(a,p,q)" say something like: "The state of affairs q is for an agent reason to believe that p". One defines $G(a,p) =_{Df} G(a,p,t)$, where t is a tautology ("a believes that p").

Lewis defines the concept "q *indicates to* a *that* p" in C,52ff in such a way that it can be represented by G(a,p,q). We can then make the following assertion:

$G(a,G(b,A),A) \wedge G(a,B,A) \wedge G(a,\bigwedge pq(G(a,p,q) \equiv G(b,p,q))) \wedge \neg G(a,\neg A) \supset G(a,G(b,B),A)$, which corresponds to Lewis's thesis on p. 53, although in that thesis the antecedent $\neg G(a,\neg A)$ doesn't occur. The range of definition of the variables "p" and "q" is restricted to states of affairs which are relevant in the context of the conventions, as these are considered respectively. Let A and B be corresponding sentences.

We prove this assertion as follows:

It is generally the case that (a): $G(a,B,A) \wedge G(a,A) \supset G(a,B)$ and that (b): $\neg G(a,\neg A) \supset (G(a,B,A) \equiv G(a,A \supset B))$. From $G(a,B,A)$ follows $G(a,G(a,B,A))$. Together with $G(a, \bigwedge pq(G(a,p,q) \equiv G(b,p,q)))$ this yields $G(a,G(b,B,A))$ (α). From $G(a,G(b,A),A)$ follows with $\neg G(a,\neg A)$ $G(a,A \supset G(b,A))$ (β). Following (a) we further have $G(a,G(b,A) \wedge G(b,B,A) \supset G(b,B))$, and therefore together with (α) and (β) $G(a,A \supset G(b,B))$; $\neg G(a,\neg A)$ and (b) finally yields $G(a,G(b,B),A)$.

Lewis then goes on to define on p. 56 the concept "*in* P *it is common knowledge that q*" by means of the concept "*indicate*", as follows:

1) $\bigvee p \bigwedge x(x \in P \supset G(x,p) \wedge G(x,\bigwedge y(y \in P \supset G(y,p),p) \wedge G(x,q,p))$.

But we have $G(x,A) \supset (G(x,B,A) \equiv G(x,B))$. Therefore (1) is equivalent to

2) $\bigwedge x(x \in P \supset G(x,q) \wedge G(x,\bigwedge y(y \in P \supset G(y,q)))$.

On the assumption that the members of P believe that they share the same inductive standards and the same background information concerning the relevant states of affairs (cfr. C,53,56), (1) should according to Lewis yield the higher-order expectations, that is, G(a,B) should yield G(a,G(b,B)), G(a,G(b,G(c,B))), etc. for all agents a,b,c,... in P. We can formulate this assumption as follows:

3) $\bigwedge x(x \in P \supset G(x,\bigwedge ypq(y \in P \supset (G(x,p,q) \equiv G(y,p,q)))))$.

On the one hand, it is sufficient to demand instead of (2) and (3)

2′) $\bigwedge x(x \in P \supset G(x,q))$ and

3′) $\bigwedge x(x \in P \supset G(x,\bigwedge yp(y \in P \supset (G(x,p) \equiv G(y,p))))$.

But on the other hand, one needs an assumption (which Lewis doesn't mention) that each member of P knows who belongs to P and who doesn't, that is,

4) $\bigwedge x(x \in P \supset \bigwedge y(y \in P \equiv G(x,y \in P)))$.

From (2′) we obtain G(a,q), where $a \in P$. This yields G(a,G(a,q)); together with (3′) it yields $G(a,\bigwedge y(y \in P \supset G(y,q)))$; together with $b \in P$ and (4) G(a,G(b,q)). From this in turn we obtain G(a,G(a,G(b,q))); together with (3′) we obtain from it $G(a,\bigwedge y(y \in P \supset G(y, G(b,q))))$; together with $c \in P$ and (4) G(a,G(c,G(b,q))), etc.

In other words, we can get by with (2′) instead of (2) and with the weaker (3′) instead of (3). That is, we can express the common *belief* in P that q simply by $\bigwedge x(x \in P \supset G(x,q))$ and the common *knowledge* in P that q simply by $\bigwedge x(x \in P \supset W(x,q))$. Here "W(a,p)" means "a knows that p". We can define $W(a,A) =_{Df} G(a,A) \wedge A$.

2. We also have conventions where not in every single application of f is there a coordination problem (C, II. 3).

We have already allowed for this case in D1.4–5 and D1.4–6. The definition at which Lewis arrives as a result (C, 76) again has, compared to our definitions, the shortcoming that it will not exclude any action-procedure which has been marked out as the one and only rational procedure to follow.

3. For a convention to exist, it is not necessary that *all* members of P *always* adhere to strategy c in respect of f; it is sufficient if *most* of the members do this *most* of the time (C, 78).

If a member of P never or only rarely behaves according to c he doesn't participate in the convention and we will then have to restrict P accordingly. It will therefore be sufficient to widen D1.4–5 (and D1.4–6 correspondingly) in such a way that all members of P keep to the strategy in most cases.

In what follows we will understand conventions in the sense of this wider definition.[10]

Finally, it is for many cases appropriate to give the notion of a convention a more subjective tone. If an agent X by mistake doesn't follow strategy c in a situation S we won't yet speak of a violation of a convention by X. For this purpose one can change the notion of a strategy as it was understood in D1.4–2 in such a way that c is a (subjective) strategy of X in respect of $\mathfrak{S}$ and $\mathfrak{H}$ if c(S) indicates for all $\mathfrak{H} \in \mathfrak{S}$ for which c(S) is defined the action-procedure $h \in \mathfrak{H}$ which X *strives* to carry out, provided he *believes* that S exists. If one applies D1.4–3—D1.4–6

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10 What distinguishes D1.4–6 from Lewis's definition in C, 76 and our extension of cD1.4–6 from his definition in C, 78 can be summarized in the following points:

a) Lewis only assumes a coordination problem in the wider sense instead of a coordination problem in the stricter sense. That is, he inadequately also classifies as conventional behavioural procedures which have unequivocally been marked out as the best procedures to follow.

b) Lewis demands an approximate concurrence of the preferences in P regarding all possible results of the actions of the agents in P, while we demand that all agents in P prefer the CE.

The explicit demands concerning the expectations and preferences of the members of P are made by Lewis only in sensu diviso: that is, only from one situation to the next situation in which the members of P act. This extension is, however, cancelled out again by his demand of "common knowledge": if a believes that he believes in all situations S that p holds, this will make sense to a only if a believes that p holds in all situations S.

Moreover, Lewis doesn't speak of strategies, but of regularities in behaviour which consist in doing R in all situations of the kind S in which one participates as an agent. But what is thus described is surely a strategy; and all strategies can be so described, if necessary, by redefining R and S. Finally, it remains unclear in Lewis whether in a situation S only the preferences of those who actually *participate as agents* in S are considered in conditions (3), (4) and (5) of his definition—which would be inadequate since, for example, only *one* agent need be acting in S—or whether the preferences of *all* members of P are considered.

to such a notion of a strategy one again obtains a wider notion of a convention. Although such distinctions are important we won't consider them in what follows, so as not to burden the presentation of the basic ideas with secondary problems.

1.5. Conventions and norms.

Let us assume that driving on the right had originally been a pure convention. However, afterwards this convention had been codified by a statutory norm, backed up in turn by sanctions. Can we then still say that driving on the right is a convention?

Sanctions serve to modifiy the subjective preferences in such a way that what is being ordered is actually preferred. If originally we had a coordination problem in the stricter sense with at least two coordination equilibriums (driving on the left or driving on the right), neither of which had been marked out as the rational one, then we now have only a coordination problem in the wider sense, for because of the sanctions driving on the right is now clearly preferable. One can, however, still speak of a coordination problem because the success of the strategy for the individual still depends on the others also keeping to it: if all the others suddenly were to drive on the left he would do likewise, sanctions or no sanctions.

If there is a norm involved one may still be inclined, —as in the case of driving on the right—, to speak of a convention; but one will hardly look on, e.g., paying taxes as being conventional. At the basis of this too lies a cooperation problem: it involves getting together money for communal enterprises by the State, and the arrangement concerning the sharing of the taxburden can be seen as a compromise. There is, however, no coordination problem: there will be many people, who would prefer a situation in which all the others paid their taxes, but not they themselves. In that case there will be no coordination equilibriums without statutory regulations and sanctions: that is, no stable states. Here norms are necessary to stabilise. If they are effective we have a coordination problem in the wider sense (the success of my tax-paying depends on most of the others paying their tax too), but not a coordination problem in the stricter sense.[11]

If in D1.4–5 one leaves out the addition "in the stricter sense" one gets a notion of a convention which is too wide. If a convention has been codified by a norm it seems therefore more adequate to speak of "conventional norms" or "regulated conventions". Conventional norms then are norms, not conventions in the sense of D1.4–5. Conventions in our sense are compatible with norms for conventional strategy c *only if* they tell us to behave "according to c *or* according to c′", —where c′ is a strategy which solves the same coordination problem as c. But something like that would seem to occur only rarely.[12]

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11 Cfr. C, section III, 2.

12 From the existence of a convention in P doesn't follow an obligation of the members of P to act according to the convention. The convention may,for example, further ends that are morally wrong. Cfr. C. III, 3.

2. Signs

2.1. *Conventions of communication.*

Coordination problems arise, for example, in the case of an agent X who wants to notify another agent Y of something, wants to inform him that a state of affairs p exists. If Y can observe that state of affairs directly it will be sufficient for X to draw Y's attention to it. If Y can directly observe a state of affairs q which he immediately recognises as a natural sign or symptom that p exists, it will be sufficient if X draws Y's attention to q. For all other cases linguistic signs serve as a conventional substitute for natural signs. For the sake of simplicity we consider first only individual conventional signs or *signals*.

If in a group P the common strategy c exists, on the one hand to perform an action f (here: to give a certain signal) *only if* the state of affairs p exists, and on the other hand to assume (to trust) that p, in case a member of P does f, then the coordination problem concerning information on p can be solved: the speaker wants the listener to know that p; and the listener wants to be informed whether p. This success can be achieved with the common strategy c concerning f. Furthermore, each agent in P expects all the other agents in P to behave according to this strategy. In other words, he expects as listener that the speaker adheres to c, that is, he expects that p exists in case the speaker does f. And the speaker expects that if he does f the listener will react to that with the assumption that p. Thus c is a convention in P in the sense of D1.4–5. The expectation of the individual that all members of P adhere to c is based on his assumption that it is commonly known in P that c represents a convention. One could not expect the listener to react to f with the assumption that p if he didn't, for his part, expect also that the speaker will do f only when p is the case. And one couldn't expect the speaker to do f in the event of p being the case if he didn't, for his part, expect the listener to react with the assumption that p. Conventions of communication are therefore also conventions in the stricter sense of D1.4–6.

We cannot assume, however much we are inclined to do so, that strategy c in respect of f consists merely in doing f, only if p.[13] Such a strategy doesn't really solve the coordination problem. It does not make sense, until the listener too reacts with the assumption that p. If this is not part of the strategy the listener may still react that way if he knows the speaker-strategy and expects that the speaker will behave according to c. But it doesn't make sense for the speaker to behave that way if he can't rely on the appropriate reaction of the listener. This approach therefore misses the existing problem of coordinating the action of the speaker and the reaction of the listener.

One must include in the communication strategies c the listener's responses because problems of understanding are always a matter of coordinating the actions

[13] This is, for example, the opinion of Schiffer, in (72) p. 151, who criticises Lewis's concept "signal-convention" for this very reason, because in his view conventions of language don't always solve coordination problems.

of speaker and listener ("actions" understood here in a somewhat wider sense). That is shown also by commands which, next to assertions, form another basic type of communication.

Here strategy c looks like this: the speaker does f only if he wants the listener to perform an action r and the listener reacts to an f-action of the speaker with this action r. This basic schema has of course still to be differentiated, like that of assertion. In the case of assertion, the speaker is already justified subjectively to do f if he *believes* that p is the case. And the listener is obliged to assume that p only if the speaker applies f correctly, in other words, if p is actually the case: he is subjectively correct therefore if he assumes that p *only if* he believes that the speaker behaves in accordance with c, that is, doesn't lie and isn't mistaken; if he believes, in other words, that the speaker is competent and sincere. In the basic schema of commands is to be included that the speaker does f only if he not just wants the listener to do r, but also has the authority to demand it from him. To this extent therefore the listener is held to do r according to c only if the speaker has the authority to command.

Assertion and command are by no means the only types of communication. We don't, however, want to try to analyse here the variety of such types (types of speech), but will content ourselves with general schemata for communication strategies.

One could try to reduce all acts of communication to assertions and to understand the listener's reactions r always as an assumption that something is the case. On that basis, if the speaker were to command the listener to do r he would be asserting to the listener that he wants him to do r. The listener would react to that with the assumption that the speaker wants this. The outcome of this assumption —together with other conventions or norms saying that certain people (among them the listener) should do what certain other people who have the authority to give orders (among them the speaker) want them to do—the outcome would be the reaction r of the listener or an obligation for him to do r. In this account the listener would not violate the linguistic convention if—following a correct f-utterance—he doesn't do r; he would merely violate other conventions and norms.

In that case, however, the communication strategy must presuppose such norms and refer to them. Without the presupposition that the listener reacts to f with r—on whatever grounds—the strategy in respect of f would not immediately make sense to the speaker, and a coordination problem would not be solved merely by the speaker doing f. And that presupposition would make the listener's reaction again part of the communication strategy.

A corresponding problem exists for the attempt to reduce all acts of communication to commands by reducing the terms of the speaker to the intention to induce in the listener reaction r. The strategy concerning f would then comprise solely that one does f, only if one wants the listener to do r. This, however, applies to assertions only if there are norms demanding from the listener to believe p

only if p actually is the case. Such norms would then again become presuppositions for the listener's reaction to make sense and thereby again part of the communication strategy.

We can now determine a general schema (CC) for communication strategies c in respect of an action-procedure f as follows: Strategy c contains two components. The *speaker-component* concerns the conditions under which an action of the kind f will be directed by a group of speakers S at a group of listeners L.[14] It has the form of a condition

SC) Under condition $P_S(S,L,f)$ f is directed by S at L only if (or: if and only if) $M(S,L,f)$,

or under a system of such conditions. Here $P_S(S,L,f)$ is a conjunction of presuppositions which, according to the strategy, regulate for S a performance of f vis-a-vis L,[15] and $M(L,S,f)$ is a conjunction of conditions (external circumstances and internal states of the speaker) which make up the special content of the communication.[16]

The *listener-component* concerns the conditions under which a certain reaction r by L follows actions of the kind f by S which are directed at L. It has the form of a condition

LC) Under condition $P_L(S,L,f)$ r is performed by L if (if and only if) an action f by S is directed at L,

or under a system of such conditions. Here $P_L(S,L,f)$ is a conjunction of conditions under which a reaction r to f is regulated according to the strategy.

For the sake of simplicity, we will in what follows always assume that strategies SC and LC are defined by two single conditions.
Examples:

a) For an SOS-call from ships a flag-signal is established. The SC says: if a ship L is within view of ship S (P_S) S will show L the SOS flag only if S is in distress (M). LC says: if L is in a position to come to S's rescue (P_L) L will come to S's rescue (r) if S shows L the SOS flag.

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14 When we talk of a *group* of agents we don't mean a *set* of agents: firstly, a group which consists of only one member is to be identical with this member (while we would otherwise have $\{a\} \neq a$) and, secondly, groups can be structured as different members play different parts in the group which are relevant for actions by the group. When one invites a group of actors to play "Hamlet" one doesn't imply that every actor should do the same but one implies that they should do something jointly by playing different parts.

15 This condition P_S restricts the range of definition of strategy c. We did allow strategies in D1.4–2 which are not defined for all situations.

16 Compared to the positive conditions for (the performance of) f, the negative conditions for (the omission of) f (that is, for the performance of $\neg f$) seem to be of small importance in connection with strategies of communication, insofar as they don't result from conditions of the form "if P_S then f if and only if M".

b) If S is a policeman S will give L a certain sign (f) if and only if L should stop (M). And unter condition P_S L will stop (r) if S gives him sign f.

We can term conditions P_S and P_L *presuppositions* of f, the *speaker-* and *listener-presupposition* respectively. If the speaker acts in accordance with strategy c he will presuppose first of all in a performance of f that P_S is fulfilled. But he will assume also that P_L holds because otherwise he cannot expect L to react with r, in which case f would not make sense to S. And the listener will in a performance of r following f assume, not merely that P_L is fulfilled, but he will also expect that S adheres to c, i.e., that P_S holds. Consequently, we can also combine P_S and P_L in a joint presupposition $P^* = P^*(S,L,f)$ of the two conditions SC and LC.[17]

2.2. *Purely conventional actions*

We distinguish *action-performances* from *action-procedures* (both are usually called "actions"): a performance of an action-procedure f is an actual, in dividual act, in time and space, by a certain subject and of the form f. In the case of actions of communication we speak specifically of *utterances*.and we distinguish consequently between the *performance of an utterance* and the *form of an utterance*. We distinguish furthermore the actions from their *results*, that is, the action-performance from the concrete result of this performance which will be an instance of the type of result that corresponds to the action-procedure. In the case of acts of communication we speak of an *instance of an expression* and the *form of an expression*. (Where a distinction is not necessary one can generally speak of "expressions".)

Consequently, we obtain for acts of communication the following schema:

	Action	Result
Type	utterance-form	form of expression
Instance	utterance-performance	instance of expression

A communication strategy c applies to an utterance-form f; it says that utterance-performances of f, that is, acts of the form f, will be carried out by the speaker only under certain conditions and will be answered by the listener, under certain conditions, with certain reactions of the form r. One can express the same thing also by saying there exists a strategy for the expression-type f* (as a result of f), which says that only under certain conditions will this expression be employed by the speaker and answered by the listener with certain reactions. In this sense communication strategies can also be understood as strategies for the use of expressions (as types), —and as strategies for reacting to them; the latter is usually not taken into consideration.

Instead of acts of communication we also speak of *signal-actions* and we also say "sign" instead of "expression".

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17 Our concept "convention of communication" is analogous to Lewis's concept "*signaling convention*" (C, 135).

In order for a conventional sign to be intelligible, it must be guaranteed that it is employed only in accordance with the convention. If the signal-action f also makes sense independently of the convention then it isn't unequivocally evident to the listener, —in a situation which pertains to the convention—, whether the speaker adheres to the convention, or perhaps—in violation of this convention—does f for another purpose. The listener may indeed expect the speaker to adhere to the convention, but this isn't completely unequivocal. The listener cannot, for example, always recognise clearly whether the speaker believes that presupposition P* is fulfilled or not. It can also happen that S believes that by doing f he can pursue the other (natural) end—and still be in accordance with the convention—because he falsely assumes that P* is not fulfilled. If this mistake on the part of S is not evident to L he (L) will be misled by action f by S. Consequently, for signal-actions *purely conventional* acts will be preferred, that is, acts which only make sense because of the convention which exists for them. (It can still make sense to drive on the right without the convention in question, for example, if one wants to avoid the bad surface on the left. On the other hand, it would not make any sense to say "Good morning" if there wasn't a convention to that effect.) This is shown also by the fact that turning an action—which already serves other ends—into a convention for purposes of communication, could result in a conflict if that same action serves two ends, of which only one is intended.

We want to assume therefore in what follows that the acts of communication we consider are purely conventional, so that they are meaningless in those cases where the presupposition P* is not fulfilled.

2.3. Meaning

In the introduction it was said that Lewis's notion of a convention was a fruitful starting-point for the development of a satisfactory theory of meaning. We can now further illustrate this claim in the case of single signal-actions and signs.

Let us start with signal-actions. There is a general notion of understanding and meaning in the case of actions, which is not restricted to linguistic actions: we say that we *understand* an action f by an agent X in its relevance for X if we know the intention, the end which X pursues by it, and if we see that given that end it makes sense under the existing circumstances. To formulate it somewhat more generally: we understand f if we recognise that f makes sense on the criterion of maximum utility (cf. 1.3), given X's preferences and expectations. The *meaning* of an action f by X for X himself is the role which f plays for X in the realization of his intentions—in other words, we know the meaning of f if we understand f. In addition, f can also play a role for agents other than X who are part of the action-situation. For them the meaning of f will consist in the role which f plays and the relevance which f has for their own actions and their own objectives. We

therefore understand action f in its relevance for an agent Y if we know the meaning of f for Y.

If we apply these general notions to acts of communication we can say: listener L understands a performance f′ of utterance-form f by speaker S if he understands, firstly, the relevance of f′ for S and, secondly, the relevance of f′ for himself. Since, on our supposition, f is a purely conventional act, f′ is intelligible only because of knowledge of the convention for f. We presuppose that S and L are members of language-community P in which a strategy c for f is a convention in the sense of D1.4–6. Then L will know c and assume that S adheres to c and does f in order to solve a coordination problem. If S does adhere to c presupposition P* must be fulfilled in situation T in question, as well as condition M. L knows therefore that S assumes in T that M obtains and, given this condition, has an interest in L doing r *and* he knows that S believes that L—in the case of P* and M obtaining—also has an interest in doing r. As a result L recognises that action f′ by S in T makes sense for S, that is, he understands the relevance of f′ for S and the meaning of f for S. And he understands the intention on which S acts in f′, viz., to bring about reaction r in L.

L understands, secondly, the relevance of f′ for himself: L has—given conditions P* and M—an interest in doing r because it results for him in a relatively optimum result (in the sense of a coordination equilibrium). Action f′ by S will indicate to L that M obtains, i.e., that it is appropriate for him to do r. Hence he understands the relevance of f′ for himself, too.

If we had determined conventions of communication only in the sense of D1.4–5 the outcome might have been that acts of communication would be unintelligible. If L doesn't know that strategy c for f is a convention in the sense of D1.4–5 (so that c is not a convention in the sense of D1.4–6), he will still expect that M obtains if S does f, because he expects S to behave according to c; but he may assume that S doesn't expect, while doing f, that he (L) will react to it with r, or assume that it isn't in S's interest. But then L will not be able to understand f′ as an action which —from S's viewpoint —makes sense.

The meaning of f′ results from the convention for the action-procedure f. Consequently, we can also speak of the meaning of f which is established by convention c for f. A performance f′ of f can acquire, within the concrete situation, an excess-meaning which not all the other performances of f have. Thus the assertion "it rains" can—by virtue of the concrete situation—also function as a recommendation ("take your umbrella with you") or as a command ("shut the window, to stop it raining in"). This meaning, this role of a speech-act is the result of its meaning as established by the general convention for f, *and* of the special circumstances of the utterance-performance. It is therefore mediated *through* language, but not fixed purely *in* language. For the sake of simplicity, we will leave this excess-meaning out of this account in which we are only concerned with the fundamental aspects of the matter.

Finally, we can also speak of the meaning of the sign f* as expression-form, that is, as type of result of utterance-form f, since f* and f clearly correspond to each other.

It is crucial in these initial stages of the theory of meaning that, —as opposed to the realistic theories of semantics—, we do not primarily assign some kind of entities (things, properties, propositions etc.) as references to expression-forms (as the linguistic objects); but rather that we understand that utterance-forms (as linguistic action-procedures) acquire—through conventions of communication—a meaning in a general sense, as role or function of these action-procedures. The theory of meaning-as-use is based on the idea that objects, called expressions, are assigned a meaning, through rules for their employment. This idea indeed approaches the thesis discussed here, since reference is made to rules for acts of speech, but because of its one-sided orientation on the speaker-component of the convention, it remains unintelligible just how rules for the use of expressions can effect a coordination of action, in contrast to, for example, the rules for moving chess-pieces. That, in conventions of language, listener's reactions *must* be included too, has been stressed at first by the speech-act-theory. But there too the structure of the conventions and thereby the accomplishment of the speech-acts, remains obscure. It is Lewis's chief merit, in his analysis of the conventions of communication, to have laid the basis for a satisfactory understanding of the function and the accomplishment of speech-acts, and thereby of their meaning.

We speak of "meaning" in a general sense also, when applied to states of affairs, not only actions. We say, for example, that a state of affairs p is an *indication* for another state of affairs q, or that p *means* q, if one can infer that q is the case from p being the case, or if p renders q at least probable. Falling atmospheric pressure is, for example, a sign for a deterioration of the weather, or diffuse red spots on the skin a symptom of scarlet-fever. Next to such natural signs p for states of affairs q for which "if p then q" holds by virtue of correlations governed by laws of nature, we have conventional signs for which this correlation holds by virtue of conventions. They are artificial indications that have the advantage that we can produce them freely, that we can characterize them unequivocally as signs for certain states of affairs, and that by means of them we can in form the listener of states of affairs to which he otherwise has little or no access at all (like past events or our intentions, wishes and convictions). The borderline between artificial and natural signs is in all this not a sharp one, since, for example, gestures that have the character of a natural sign can be turned into conventions too.

This talk of sign and meaning can also be directly applied to language: if a strategy c for f is a convention in P then the fact that a speaker S performs f in a situation T is an indication for listener L that M holds and that S wants L to do r. For if S and L belong to a language-community, S will adhere to c, that is, he will perform f only if M holds and if he has an interest in L doing r. That S does f means for L, in this sense of "meaning", that M holds and that S wants L to do r.

One usually distinguishes between the *meaning* of an utterance and its *presupposition*. The presupposition must necessarily be fulfilled, or the utterance will not make sense; while the meaning will give the specific sense of the utterance. According to this distinction P* indicates the presupposition of an act of communication f: only if P* obtains in a situation $\mathfrak{S}$ is the performance of f regulated by the convention. And since f is a purely conventional act f will be a significant action in this case only. The meaning of f will then be specified by M and r only: if M holds then S and L have an interest in L doing r, and this will be effected by S's utterance of f.

H. P. Grice suggested in (57) to define the notion of conventional meaning, and generally the case of "nonnatural" signification (as opposed to "natural", symptomatic signification), as follows:

D1: S means_{nn} r by f in situation T $=_{Df}$ S intends by f in T to induce in L response r by making L recognise this intention.

D2: f means_{nn} r $=_{Df}$ for all (most) speakers S and situations T: if S does f in T S means_{nn} r with f in T.

For what S means with a speech-act f is the intention which S pursues with f. This intention is to induce in listener L a reaction r. Since f is not a natural cause of r this only succeeds through the convention for f. If L knows this convention he understands f as a request to do r, and will do r if he adheres to the convention. By virtue of his knowledge of the convention L recognises, therefore, that S wants him (L) to do r. That will induce him to do r since a coordination problem exists which will be solved by the joint strategy for f. So if S means_{nn} r by f in T, where r is an action by L, then S intends with f in T to induce in L reaction r. And because he knows that L does r given f only if he knows the convention, i.e., S's intention, one can say: S attempts to bring about r by making L recognise this intention.

The reverse, though, does not hold, as Searle, Lewis and Strawson have shown:[18]

1. The intentions which one pursues as speaker with f often go beyond the immediate reaction r of the listener, beyond that, in other words, which belongs to the conventional meaning of f. For example, one informs L that q is the case, with the intention that L will react, first with the assumption that q, but consequently —given the circumstances—will do r′. r′ does not belong to the conventional meaning since, with the same r, r′ may vary completely from case to case. Grice, for this very reason, distinguished between primary and secondary responses and demands that only the primary responses (in our case r, but not r′) should be considered in D1. However, this distinction is not clear and must also refer to the content of the convention for f, for the characterization of which D1 was supposed to be a substitute in the first place.

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18 Cfr. C, 157 ff, Searle (69), 2.6, and Strawson (64).

2. If S is mistaken regarding the convention for f then his intentions don't correspond to the convention and one cannot say then that f (on the strength of the convention) means the response which S intended.

3. Most of all: not just the conventional meaning is grasped in D1 (that wasn't Grice's intention either). Strawson gives an example of an act f which satisfies the definiens in D1, but in which we cannot possibly talk of a conventional meaning of f: "S ... arranges convincing-looking "evidence" that p, in a place, where L is bound to see it. He does this, knowing that L is watching him at work, but knowing also that L does not know that S knows that L is watching him at work. He realizes that L will not take the arranged "evidence" as genuine or natural evidence that p, but realizes, and indeed intends, that L will take his arranging of it as grounds for thinking that he, S, intends to induce in L the belief that p ... He knows that L has general grounds for thinking that S would not wish to make him, L, think that p unless it were known to S to be the case that p; and hence that L's recognition of his (S's) intention to induce in L the belief that p will in fact seem to L a sufficient reason for believing that p. And he intends that L's recognition of his intention ... should function in just this way" (Strawson (64), 446, f).

Searle has pointed out that in a definition of linguistic meaning one must refer to conventions: speaker S must act in accordance with a convention for f in order to mean something conventionally by f, i.e., mean that which one conventionally means by f, or in other words: that which f means. As Lewis has shown (C, 155) and as we have seen above, reference to conventions makes reference to intentions superfluous. For from the fact that S employs f in accordance with convention c it follows that by doing f he wants to induce in listener L reaction r (by making him recognise this intention).

Lewis's thesis already contains then the idea, on which Grice's definition is based, that speech-acts are set apart from other actions by the fact that they already reach their objective by this and only this: that the others recognise that very objective. It is more precise, though, than Grice's notion which is too wide (for linguistic meaning), and it is more natural since he derives the notion of linguistic meaning from the general notion of meaning by reference to conventions of communication which establish the role and function of speech-acts.

3. Languages

3.1. A model of logical grammar.

A language is not a system of signals, i.e., a set of signs for which individual conventions of communication are established. The grammar with which we describe a language is a system of rules which by no means all characterize communication strategies. There are syntactical rules for the construction of well-formed expressions: and semantical rules don't only relate to expressions and sequences of expressions (sentences or texts) which can be employed for communication, but

relate also to single words; and as regards sentences and texts, the conventions for them are based on the semantical rules for the parts of speech of which they consist.

In this section we want to illustrate the construction of a grammar by taking as example the logical grammar of a simple language L from predicate logic which has indexicals and performative operators. In the next section we will then discuss the relationship between the semantical rules and the conventions of communication. The construction of this grammar is carried out in three steps, in the first two of which we will construct a grammar for the sentence-radicals in a way which is customary in logic.

3.1.1. *The syntax of L*

The *alphabet* of L will contain, besides punctuation marks (parentheses, comma) and logical symbols ($\neg$, $\wedge$, $\bigwedge$), object-constants and object-variables (OC and OV), predicate-constants (PC) (each of a particular place-number) and the performative operators $\mathfrak{B}$, $\mathfrak{F}$ and $\mathfrak{H}$. OC's are especially the indexicals s (I), h (you), d (this). The *sentence-radicals* (SR) of L are determined like this:

a) If F is an n-place PC and $a_1, \ldots, a_n$ are OC's then $F(a_1, \ldots, a_n)$ is an SR
b) If A is an SR then $\neg A$ is an SR
c) If A and B are SR's then $(A \wedge B)$ is an SR
d) If A[a] is an SR and x is an OV which doesn't occur in A[a] then $\bigwedge x A[x]$ is an SR too.

The *sentences* of L are determined like this:
If A is an SR and P a performative operator then P(A) is a sentence.

3.1.2. *Semantics of the SR's*

Let U be a non-empty set of objects and I a non-empty set of possible worlds with the objects of U. I is to be the set of all triples $j = \langle \alpha, \beta, \gamma \rangle$, where α and β are agents from U and γ is an object from U. Let $(j)_1 = \alpha$, $(j)_2 = \beta$, $(j)_3 = \gamma$.

An *interpretation* of the SR's over U, I and J is a function φ such that for all $i \in I$ and $j \in J$:

a) $\varphi_{i,j}(a) \in U$ and
b) $\varphi_{i,j}(a) = \varphi_{i',j'}(a)$ for all OC's except s, h, d.
c) $\varphi_{i,j}(a) = (j)_1$, $\varphi_{i,j}(h) = (j)_2$, $\varphi_{i,j}(d) = (j)_3$.
d) $\varphi_{i,j}(F) \subset U^n$ (where U^n is the set of n-tuples of objects from U) and
e) $\varphi_{i,j}(F) = \varphi_{i,j'}(F)$ for all n-place PC's
f) $\varphi_{i,j}(F(a_1, \ldots, a_n)) = w$ if and only if $(\varphi_{i,j}(a_1), \ldots, \varphi_{i,j}(a_n)) \in \varphi_{i,j}(F)$
g) $\varphi_{i,j}(\neg A) = w$ if and only if $\varphi_{i,j}(A) = f$
h) $\varphi_{i,j}(A \wedge B) = w$ if and only if $\varphi_{i,j}(A) = \varphi_{i,j}(B) = w$
i) $\varphi_{i,j}(\bigwedge x A[x]) = w$ if and only if $\bigwedge \varphi'(\varphi' \underset{b}{=} \varphi \supset \varphi'_{i,j}(A[b]) = w)$.

Here $\varphi' \underset{b}{=} \varphi$ says that interpretations φ and φ' agree to at most the values $\varphi'_{i,j}(b)$ and $\varphi_{i,j}(b)$ for any number of index-pairs $\langle i,j \rangle$.

If we have $j \in J$ and if A is an SR we will call the pair $\langle A,j \rangle$ an *utterance-radical* (UR). If A is a sentence we will call $\langle A,j \rangle$ an *utterance*. j specifies speaker, listener and object spoken about of a UR or an utterance, as the case may be. $\langle A,j \rangle$ is therefore (where A is a sentence) an utterance by $(j)_1$ addressed to $(j)_2$. And, in case d occurs in A, $\langle A,j \rangle$ is an utterance about $(j)_3$.

Hence an interpretation of the SR's over U, I and J is a correlation of states of affairs to SR's and UR's in L: $\lambda i \varphi_{i,j}(A)$ is the state of affairs which is expressed by UR $\langle A,j \rangle$ (where λ is the symbol for abstraction), $\lambda ij \varphi_{i,j}(A)$ is the state of affairs which is expressed by SR A.

3. *Communication strategies for sentences.*

(1) and (2) establish the usual notion of an interpretation for logical languages. By themselves, however, these correlations of objects and states of affairs to expressions in L don't yet define communication strategies. We will have to establish these strategies seperately if we want an interpretation of the *sentences*. In our exposition communication strategies appear as interpretations of the performative operators, so that the meaning of a sentence P(A) depends on the state of affairs which is correlated to its SR (in the sense of the usual logical semantics) *and* on its performative mood which is established by P.

We interpret the operators $\mathfrak{B}$, $\mathfrak{F}$ and $\mathfrak{H}$ as indicative, imperative and interrogative moods (the interrogative mood of interrogative *sentences*).

$\mathfrak{B}$) SC: An utterance $\langle \mathfrak{B}(A),j \rangle$ will be made in i only if $\varphi_{i,j}(A) = w$ (i.e., if the state of affairs which is expressed by $\langle A,j \rangle$ exists in i).

LC: To an utterance $\langle \mathfrak{B}(A),j \rangle$ in i $(j)_2$ reacts with the assumption that $\varphi_{i,j}(A) = w$.

$\mathfrak{F}$) SC: An utterance $\langle \mathfrak{F}(A),j \rangle$ will be made in i only if $(j)_1$ wants $(j)_2$ to realize the proposition $\bigwedge i \varphi_{i,j}(A)$ *and* is in a position of authority over $(j)_2$.

LC: If $(j)_1$ has the authority in i to command $(j)_2$, $(j)_2$ reacts to $\langle \mathfrak{F}(A),j \rangle$ by realizing the proposition $\lambda i \varphi_{i,j}(A)$.

$\mathfrak{H}$) SC: An utterance $\langle \mathfrak{H}(A),j \rangle$ will be made in i only if $(j)_1$ in i wants to know from $(j)_2$ whether $\varphi_{i,j}(A) = w$ (i.e., whether the state of affairs $\lambda i \varphi_{i,j}(A)$ obtains in i).

LC: To an utterance $\langle \mathfrak{H}(A),j \rangle$ in i $(j)_2$ reacts with utterance $\langle \mathfrak{B}(a),j' \rangle$ or $\langle \mathfrak{B}(\neg A),j' \rangle$, as the case may be, (where $j' = \langle (j)_2,(j)_1,(j)_3 \rangle$), depending on whether $\varphi_{i,j}(A) = w$ or $= f$.

These formulations must be understood as only roughly approximate characterizations of assertion, command and question. Because, first of all, there are several types of these performative moods between which one would have to make distinctions, and, moreover, one would have to specify presuppositions, like for example in ($\mathfrak{F}$), that the state of affairs which the listener should bring about

doesn't already exist, that he is capable of bringing it about etc. However, our aim here is not a fully adequate characterization, but only an illustration of the schema according to which a grammar can be constructed.

Lewis's description (in C, V.4) of the convention for the use of a language L means that the whole of language is constructed and interpreted by him in the sense of an SR-language, including the performative operators which are interpreted in analogy to the schema "true"-"false" for indicative sentences. In his description the communication strategy applies to language as a whole (to the system of all its rules) and says only that all members of language-community P strive to be truthful in L (C, 192); i.e., they try to utter an assertion only if it is true, to obey an imperative if one is obliged to, etc.

In our exposition there exists in P likewise an effective joint strategy of truthfulness in L in this sense. However, we give separate conventions of communication for the use of the performative operators; the framework of these conventions is then for the rest as in Lewis's exposition. But Lewis is forced, as a result of his interpretation, to specify "truthful use of an utterance" separately for each different performative mood (C, 192).

Although playing chess consists in moving pieces, not all rules of chess are rules for moving chess-pieces. One cannot, therefore, define the game of chess as a system of rules for moving pieces. On the other hand, one will not say that there is only *one* rule of chess, viz., to play chess *correctly*. For an explanation of what is "correct" presupposes that the individual rules are given according to which the players will have to proceed. Similarly, it is impossible in the case of languages to give communication strategies for all well-formed expressions, for one cannot communicate with words like "picture", "Hans", "and" etc. Hence there are no speech-acts like referring, predicating etc. (which Searle introduces in (69)); communication strategies start only with sentences. But one will then have to *define* such strategies for sentences, and that means: one will have to interpret the performative operators by means of such strategies and not through correlation. For, first of all, one cannot possibly succeed in determining the truthful use uniformly for all types of sentences; and, secondly, one should make visible as far as possible the micro-structure of communication, just as in chess one will formulate as many rules as possible as rules for moving pieces which regulate the procedure directly.

3.2. Descriptive and performative meaning.

According to this model of logical grammar it now looks as if the *descriptive meaning* of the constants and sentence-radicals which was given above in a realistic manner by correlations of objects, properties and propositions to linguistic expressions, has primacy over the meanings of *sentences* which result from the conventions of communication ($\mathfrak{B}$), ($\mathfrak{F}$) and ($\mathfrak{H}$). For the meaning of an utterance $\langle \mathfrak{B}(A), j \rangle$, for example, results—following ($\mathfrak{B}$)—from the descriptive meaning $\lambda i \varphi_{i,j}(A)$ of the SR A. In that case, however, the superiority of the

theory of meaning which results from Lewis's exposition and which we had praised earlier would be fictitious, as this theory would have a purely realistic foundation.

That this is not the case, but that on the contrary the *performative meanings* of sentences as they are established by conventions of communication can be seen as the basis of semantics is shown by the following reconstruction:

As a first step the reference of the OC's in utterances of sentences of the form $\mathfrak{B}(F(a))$ is determined. The correlation of objects to OC's in such utterances is unproblematic; problematic are only the correlations of abstract entities like properties or propositions which—on a non-realistic view—only result by abstraction from meaningful predicates or sentences.[19] The OC "d" serves as a linguistic reinforcement of pointing gestures. The reference for the other indexicals "s" ("I") and "h" ("you") of L can likewise be determined. OC's are introduced, first of all, as a substitute for indexicals when their reference is pointed at ("Fritz" with pointing gesture, or "this is Fritz"), a substitute which recommends itself by being independent of the situation.

With this the values $\varphi_{i,j}(a)$ for O Ca are fixed.

As a second step conventions of communication for elementary sentences of the form $\mathfrak{B}(F(a_1,\ldots,a_n))$ are introduced. In the case of a one-place PC F, a corresponding strategy looks, for example, like this:

I) SC: If a situation i of the kind I presents itself and if $\varphi_{i,j}(a)$ is an object from a set U then an utterance $\langle\mathfrak{B}(F(a)),j\rangle$ in i will be made only if the object $\varphi_{i,j}(a)$ which is signified by "a" has the property f.

LC: If a situation i of the kind I presents itself and if $\varphi_{i,j}(a)$ is an object from the set U then listener $(j)_2$ will react to an utterance $\langle\mathfrak{B}(F(a)),j\rangle$ in i with the assumption that $\varphi_{i,j}(a)$ has property f.

By convention (I) a set of circumstances, situations or, as we have said above, worlds, is marked out in which an utterance $\langle\mathfrak{B}(F(a)),j\rangle$ is significant. For the sake of simplicity, we have assumed that I is the same set for all utterances in L. In addition, (I) marks out a set of objects, viz., those objects to which—according to (I)—the predicate F can be significantly assigned. Here too we assume for the sake of simplicity that this set U is constant for all such conventions.[20]

We can now define:

An utterance $\langle\mathfrak{B}(F(a)),j\rangle$ is *true* in i if it can be made in conformity with (I) (i.e., if it wouldn't represent a violation of (I)); it is *false* if it cannot be made in conformity with (I).

We can then determine the value $\varphi_{i,j}(F)$ as the set of objects $\alpha\in U$ for which $\langle\mathfrak{B}(F(d)),j\rangle$ is true in i, where $(j)_3 = d$. If we further stipulate: $\varphi_{i,j}(F(a)) = w$

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19 Cfr. e.g. Kamlah and Lorenzen (67), IV, par. 2.

20 If one assumes different sets I and U one must introduce partial interpretations of L. Cfr. e.g. Kutschera (75).

if and only if $\varphi_{i,j}(a) \in \varphi_{i,j}(F)$ then $\varphi_{i,j}(F(a)) = w$ if and only if $\langle \mathfrak{B}(F(a)), j \rangle$ is true in i.

There is a corresponding procedure for many-placed PC's.

In this way we are able—first of all for OC's, PC's and elementary SR's—to provide a basis to the correlations by means of the function φ, by reference to conventions of communication. One will not be able to say then that through convention (I) we still correlate a property f to the PC F in a realistic fashion. One will rather have to distinguish between the convention itself as a strategy for behaving in P and its description in a meta-language. An agent X who wants to learn language L can learn it from meta-language descriptions of its conventions like, for example, (I). However, if X learns L from the usage by other agents, for example Y, then X acquires the disposition to apply predicate F correctly in assertions of the form $\mathfrak{B}(F(a))$ without first being dependent on a description of the convention in question.

The problem of learning conventions of language is at first the same as that which presents itself for the learning of conventions in general: X presupposes that there is a common interest in coordinating actions of a certain type, that there is a coordination problem and that this is also known to Y. X also presupposes that Y will act in such a way that, given a correct reaction by X, success will result. This success can be ascertained by X. He will therefore try to react in such a way that—together with Y's actions—a joint success is the result.

In the case of conventions of language (of communication) this means: X learns first of all the role of listener, the correct reaction r to speech-acts f by Y as speaker, that is, he learns the listener-component LC of the convention in schema CC as he observes S's reactions to his own reactions to f (success if Y accepts it as the correct reaction, failure if he rejects it as wrong). The speaker-component is learned by X as he observes under which conditions Y does f and as he lets himself be corrected by Y in his own applications of f. If—upon f-acts by X—Y shows reaction r (which X has already got to know as correct), this will confirm that X used f correctly. If X has learned in this way the strategy for f he will know the convention for f and thereby understand f-utterances.

According to Lewis, conventions are certainly not just explicit, that is, linguistically fixed ways of behaviour; and that is why neither the existence of conventions nor our learning them presuppose that they can be described in language. But one has to resort to linguistic descriptions if one wants to speak about conventions—as we do—or wants to comprehend them in a grammar in the form of explicit rules. Our description of strategy-schema (I) which included talk of properties does to that extent not imply that strategies of behaviour according to this schema presuppose the existence of such properties or refer to them. Thus (I) describes only a regularity of behaviour or a competence that can be learnt, and the same goes for the function φ: its introduction is nothing more than just an expedient to describe conventions of language.

For the third step in the reconstruction of φ we proceed from conventions in virtue of which an utterance $\langle\mathfrak{B}(\neg A), j\rangle$ in i is true if and only if the utterance $\langle\mathfrak{B}(A), j\rangle$ in i is false, and an utterance $\langle\mathfrak{B}(A \wedge B), j\rangle$ in i is false if and only if both the utterances $\langle\mathfrak{B}(A), j\rangle$ and $\langle\mathfrak{B}(B), j\rangle$ are true in i. If one defines the function φ for such sentences such that $\varphi_{i,j}(\neg A) = w$ if and only if $\varphi_{i,j}(A) = f$ and $\varphi_{i,j}(A \wedge B) = w$ if and only if $\varphi_{i,j}(A) = \varphi_{i,j}(B) = w$, then one obtains generally that $\varphi_{i,j}(A) = w$ if and only if the utterance $\langle\mathfrak{B}(A), j\rangle$ in i is true.

This principle can be extended to apply to universally quantified sentences: there is a convention according to which an utterance $\langle\mathfrak{B}(\bigwedge xA[x]), j\rangle$ in i is true if and only if utterances of the kind $\mathfrak{B}(A[d])$ of the same speaker, addressed to the same listener, but with all possible references to objects in U, are true (i.e., if the utterances $\langle\mathfrak{B}(A[d]), j'\rangle$ are true for all j', where $(j')_1 = (j)_1$ and $(j')_2 = (j)_2$).[21] Consequently, one stipulates that $\varphi_{i,j}(\bigwedge xA[x]) = w$ if and only if $\varphi_{i,j}(A[d]) = w$ for all j' of the kind given.

The descriptive semantics for all SR's in L can be introduced in this way, based on conventions for predicates in indicative contexts *and* on logical conventions which indicate the conditions for asserting logically complex sentences in terms of conditions for asserting constituent sentences.

The construction of the descriptive semantics of the SR's serves to determine these SR's semantically in such a way that one can give the conventions for other types of speech, for commands, questions etc., in the simple form in which it was done in 3.1. If the constants, logical operators and SR's are defined semantically by conventions in the case of indicative speech then all that is needed is an interpretation of the (other) performative operators and we will be able to assign meanings to *all* sentences.

These reflections show, in the example of a simple case, how one can get systematically from conventions of communication to intensional semantics, and they show that the latter is merely an expedient for the description of conventions of language.

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[21] For the sake of simplicity, we assume here that d doesn't occur in $\bigwedge xA[x]$ and that one can in every situation point at each object from U with "this". Otherwise one will need more indexicals "d" etc. for "that", or one will have to work, as in 3.2, with all possible correlations of objects from U to an OC which doesn't occur in $\bigwedge xA[x]$.

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