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ON ESTABLISHING THE MEANINGS OF  
EXPRESSIONS OF AN UNKNOWN LANGUAGE

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Allow me to tell you about my own idea for a utopia. An imaginative reader may find my vision of a perfect society somewhat repulsive, although in this respect my conception shares in the fate of all known utopias, but I would defend it on the grounds that it has been designed to explain the world, and not to change it. To wit, the purpose it serves is that of a thought-experiment.

The dominating cultural trait of my ideal society — let us call it group G — is its universal adherence to law and order: everyone respects the existing ideological code and the rules of social organization, always and without exception. A prominent position in the ethical system of group G is attributed to truthfulness and the principle accountability for what one says. So the people communicate to one another only what they believe, and they do so just in case the beliefs are justified. This means that, *qua* informants, everyone here trusts everyone else without the slightest reservations: having heard something, a person immediately incorporates it into his or her own stock of beliefs. Furthermore, so as to honor the principle of accountability for what one says, the G-ians only ask reasonable questions, which they always answer in earnest and to the best of their knowledge. Finally, the orders they issue are always sensible and optimal — vis-à-vis the shared system of values — so every command gets executed.

The main intellectual demand imposed on members of group G is that of good memory and consistency of beliefs: everyone who accepts a given sentence should also accept all the logical consequences it implies in conjunction with the rest of his or her beliefs. Owing to their intellectual upbringing, the

G-ians meet this demand. Not only is education adapted to fulfilling their ideals — so is language. The principle of accountability for what one says requires eliminating the possibility of verbal misunderstanding, therefore the language of group G does not contain any homonyms, ambiguous syntactic structures or indexical expressions: every sentence possesses a unique context-independent interpretation. Given the universal hypertrophy of trust to the spoken word, the range of language usage is correspondingly limited: nobody tells fables, myths or anecdotes, whereas fiction, poetry, religion and metaphysics are only practiced as genres of vocal music. Speech, as well as writing, is reserved for communicating reliable information, reasonable questions and sensible commands.

Now imagine a person from a different culture — call him the Researcher — who knew everything we have said about that society, and decided to visit it with the intention of describing its language. The Researcher's initial attempts had proven unsuccessful: the speech he heard sounded completely foreign, and he found no interpreter among the natives and no dictionary that would enable him to translate G-ian speech into his own language. Yet he was received with kindness and made to feel welcome: no one interfered with his observations and the natives happily participated in his linguistic experiments. So he set to work. Let us trace the various stages of his cognitive enterprise, highlighting its structure rather than chronology, in order to arrive at a rational reconstruction. We shall provide a brief treatment of the first phase, so as to characterize in detail the final stage, in which the Researcher establishes the foundations of a translation of G-ian sentences into his own language.

First of all, the Researcher tries to gather a rich sample of products of the linguistic behavior of members of group G, which is to say he collects as many of their UTTERANCES as he can. Note that the knowledge that members of group G communicate with one another by means of a series of noises generated in the vocal tract does not warrant the conclusion that any such series of noises qualifies as an utterance; the Researcher has to have an additional criterion to distinguish between linguistic and non-linguistic behavior. Let us assume that he does.<sup>1</sup> The result of the first stage of the Researcher's work is a record (e.g., a tape recording) of a significant number of series of sounds (physical events) constituting the G-ians' utterances. Call this set of observed utterances  $S_0^*$ .

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<sup>1</sup>The most commonly cited distinguishing characteristics of the acts of producing a series of noises that are linguistic in nature include their arbitrariness and the fact that they are oriented toward the hearer.

Next, the Researcher establishes which elements of  $S_0^*$  differ from one another in a linguistically irrelevant sense — that is to say, are tokens of the same MEANINGFUL EXPRESSION (SENTENCE). He does that by enumerating the sounds appearing in the recorded utterances and defining a relation of phonological equivalence between them.<sup>2</sup> Then, he defines the relation of type-identity (as obtained between utterances  $x$  and  $y$  if all the component sounds of  $x$  are phonologically equivalent to the corresponding component sounds of  $y$ ) and divides the set  $S_0^*$  by this relation, arriving at the set  $S_0$  of sentences represented by the recorded utterances. Furthermore, if  $S_0^*$  is a representative sample, the Researcher can compose a complete list of phonemes for the language he is reconstructing, which would enable him to pair any novel utterance (not belonging to  $S_0^*$ ) with the sentence it represents.

At a later stage, the Researcher applies himself to the task of decoding semantically the sentences he hears. By way of preparation he observes closely certain members of  $G$  so as to establish what body of beliefs each of them has. Guided by the assumption of rationality, he reconstructs the beliefs of the people under observation as sentences of his native language such that the behaviors of those people are optimal (in light of their goals, which he already knows) if and only if the sentences in question are true. Having thus obtained a catalogue of beliefs of each of the selected subjects, the Researcher then uses those people as involuntary ‘interpreters’: namely, he registers utterances addressed to them and establishes how the reception of those utterances influences the subjects’ stock of beliefs, which in turn allows him to find translations of the sentences represented by those utterances into his own language.

For he reasons as follows. Universal confidence in what is said means that the reception of any sentence (containing information that does not belong to the set of the hearer’s previous beliefs) modifies the hearer’s body of beliefs. The virtues of the language (non-indexicality and the lack of ambiguity of its sentences) and the logical prowess of the members of group  $G$  guarantee that the modification of beliefs brought about by receiving a given sentence is the same for all the hearers. Of course, this sameness does consist in the fact that the differences between the hearers’ set of beliefs prior to hearing the sentence and their subsequent set of beliefs are always the same, for those differences depend on the content of the hearer’s prior

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<sup>2</sup>It is debatable whether one can establish this relation before acquiring some knowledge about the meanings of linguistic expressions in a given language. Here, I assume that this is possible.

beliefs as well as on the content of the sentence in question. What is identical in such modifications of beliefs caused by receiving a given sentence is a sentence (of the Researcher's language) which, after being added to the set of prior beliefs, axiomatizes the set of subsequent beliefs. It is that sentence which one can take as a translation of the sentence whose reception has evoked the perceived change in beliefs.<sup>3</sup>

This is how the Researcher pairs the sentences of the language of group G received by his involuntary 'interpreters' with the sentences' translations into his own language. Thus, he establishes the truth-conditions of some sentences of the language under investigation, as well as the relations of synonymy and entailment in the set of those sentences. Note, however, that he cannot interpret every sentence heard by his 'interpreters': the sentences that do not result in a change of beliefs remain undecoded; all that he knows about such sentences is that they convey information the subjects under observation must have acquired at an earlier time. Furthermore, regardless of the number of sentences thus interpreted, the explanatory (and, therefore, predictive) value of this kind of description of the language under investigation is very limited: it enables one to 'predict' an interpretation only for sentences that have already been used in acts of communication observed by the Researcher, whereas most sentences uttered by people are novel ones. A satisfactory description of the language of a given community must provide a method for 'calculating' the meanings of all sentences that might appear in the communication acts occurring between members of the community; there are an infinite number of such sentences.

In pursuit of such a description, our Researcher will use the results obtained so far as an empirical base for theoretical hypotheses. The hypotheses will be about the set of morphemes in the G-ian language, the meanings of those morphemes and the set of syntactic structures (identifiable by suitable markers) admissible in the sentences of the language. For the Researcher is after the general principles of the segmentation of sentences into minimal units of meaning and rules that would allow him to establish the meaning of a sentence on the basis of both the meanings assigned to those units, and some observable relations that obtain between those units. So the sentences

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<sup>3</sup>There are many such sentences in the Researcher's language, but if they are all synonymous, any of them can serve as a translation. Sentences  $\alpha$  and  $\beta$ , such that each of them axiomatizes set B in set A (i.e.,  $Cn(A + \{\alpha\}) = B$  and  $Cn(A + \{\beta\}) = B$ ), can differ in meaning just in case the sentence ' $\alpha \equiv \beta$ ' is non-analytic and belongs to A (we assume A to be a system). Thus, the Researcher will choose as his 'interpreter' a person who does not possess such beliefs.

interpreted earlier, independently of those rules and principles, will serve both as the Researcher's source of inspiration in the formulation of those rules and principles and as the first test of their adequacy. To wit, while composing his list of morphemes of the G-ian language, assigning a meaning to each morpheme (by pairing with it an expression — not necessarily a morpheme — of his own language), and building a catalogue of admissible syntactic structures of sentences of the language, the Researcher will take care that this 'linguistic machinery', applied to previously interpreted sentences, and assign to them meanings identical to those established earlier. Once he has formulated hypotheses compatible with all initial data, he will test those hypotheses (and correct them, if necessary) against new data: namely, he will attempt to predict, on the basis of his hypotheses, the meaning of previously uninterpreted sentences, and then he will confront his predictions with the facts, or with the output of the previously described method for interpreting the G-ian sentences independently of the hypotheses under consideration.

Having successfully conducted a certain number of such trials, the Researcher will consider his task to be complete: he has provided an empirically adequate description of the G-ian language that determines an infinite set of sentences and allows one to translate any sentence into the native language of the Researcher, or to interpret it semantically. Thus, he has assigned truth-conditions to all sentences of the language under investigation, he has discovered all the synonymies and entailments, and he has identified all analytic sentences.<sup>4</sup> He solved the problem of interrogative and imperative sentences as follows. He made the intuitive assumption that the meaning of a question (or command) is identical with the meaning of a declarative sentence whose acceptance disposes the hearer to utter an answer to the question (or execute the command, respectively). Thanks to this assumption, by constructing the tools to identify the meanings of declarative sentences, he has provided the resources to interpret questions and commands without having to treat them as separate types of expression.

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The conditions under which our Researcher pursued his cognitive goals stand in stark contrast to the natural work conditions of a linguist trying

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<sup>4</sup>Naturally, I am assuming that the Researcher's native tongue has itself been characterized in all those respects.

to learn and describe a foreign language. First of all, the actual researcher reconstructs the language on the basis of a sample consisting of notoriously ambiguous, often deviant utterances or sentence fragments (which, in actual acts of communication, are filled in by features of extra-linguistic context). Secondly, he cannot assume that the set of beliefs of a person who has just heard a sentence is a function of the person's earlier beliefs and the meaning of that sentence: after all, normal people often tell lies and jokes, gossip, recite poetry, preach sermons, lecture in philosophy, etc., so normal recipients of utterances do not always believe (everything) they hear. Thirdly, ordinary people, as opposed to the G-ians, are not blessed with total recall or the skill of making perfectly logical inferences, which is why, even when they do believe their interlocutor, the set of their beliefs differs from the set of the logical consequences of their previous beliefs augmented by adding the newly accepted belief. The upshot of this is that a researcher, unlike the Researcher, cannot rely on evidence of the recipient's beliefs as an indication of the meaning of the sentence received.

We must now ask: How does our utopian situation relate to the position of an actual linguist working in natural conditions? How do real-life linguists collect initial data — a finite set of interpreted sentences — that serve both to inspire and to test subsequent theoretical posits, which make it possible to interpret any of an infinite number of sentences of the language under investigation? Do they collect the data in a different way, or do they decode the foreign language according to some other principles, which do not require having such an empirical base?

It is clear that, in order to answer these questions, one cannot merely observe the researcher at work for a sufficiently long time, no matter how much attention one pays to the various aspects of the linguist's behavior, because the general principles governing his or her activities are not available in direct observation. Nor can one simply ask about them, for the researcher does not have to be aware of these principles — indeed, he or she rarely is. The job of a practicing researcher is to obtain correct results; the task of providing a reconstruction of how these results have been obtained, which reveals the methodological structure of a given field of study, rests with the philosopher of science.

Professional philosophers as well as linguists concerned with the methodological foundations of their discipline have proposed a number of competing theories in this connection. I shall briefly discuss some of them.

At one extreme, we have the view that it is possible to arrive at a complete reconstruction of an unknown language by relying solely on an

existing text, and the reconstruction can be accomplished by means of a series of algorithms, each solving a particular subtask (of isolating the phones or ‘letters’, of identifying the morphemes and sentences, of establishing syntactic relations between expressions in a sentence, and, finally, of defining the meanings of sentences and their component parts). In fact, it is not necessary that a researcher possess any additional knowledge about the text, including knowledge of any of its semantics, or about the speakers of the language in which the text has been formulated — about their needs, customs, beliefs, etc. This view goes hand in hand with the belief that providing a mathematical description of particular linguistic procedures amounts to justifying them, because it endows the corresponding concepts with exact meanings; of course, this is so on the condition that the procedures in question have been successfully tried out in practice (Apresjan 1971: 158-159).

This position is programmatic: so far, no such series of algorithms, capable of decoding a language together with its semantics, has been constructed. The hope that the program can succeed derives from the fact that several algorithmic methods developed in phonology, morphology and syntax yield satisfactory results when applied to a number of known languages.<sup>5</sup> However, the position’s main shortcoming does not consist in an excessive optimism that is hardly warranted by the results obtained; rather, it is due to an incorrect assessment of the cognitive value of those results. Namely, all the linguistic algorithms to date rely on statistical regularities (of the kind: the most frequent letter occurring in the text is a vowel) observed to hold in various languages. The regularities are not explained by more general laws, however, and nothing supports the supposition that they hold for all languages: the known human languages do not constitute a representative sample of the class of all possible languages. Therefore, the mere fact that the algorithms in question yield approximately correct results when applied to several known languages does not make them scientific. Nor can they have any claim to being scientific methods on the grounds of the mathematics they employ (which, incidentally, is rather simple), for there is more to science than having precise concepts.

This negative assessment of the methodological aspects of these techniques does not detract from their usefulness as techniques rather than methods — with a limited scope of application, informed by a researcher’s intuition that is grounded in his or her ‘informal’ general and professional

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<sup>5</sup>One interesting example is the algorithm for isolating morphemes developed by Harris (1955).

knowledge.

Let us focus for a moment on the possibility of constructing an algorithm capable of yielding a semantic description of a language on the basis of an isolated text. Indeed, the very proposition sounds like something taken out of a fairy tale: there is no evidence whatsoever that any regularities concerning the shape or spatial interrelations of linguistic expressions could serve as a basis for such an algorithm. On the contrary, the well-known conventionality of the connection between a sign and its meaning seems to speak against such a possibility. In order to establish the meanings of linguistic expressions, a researcher has to consider the role those expressions play as tools of communication, which is to say, he or she has to study the text 'in action'. It must be admitted that a vast majority of theorists share this view: only a handful of authors cling to the hope that one day we may discover methods for programming a machine that could decipher a text in Martian, should the Martians ever decide to send us one.

However, there are a variety of stances that one can take toward the issue of how directed observation of communication phenomena leads to the discovery of the meaning of linguistic expressions. According to one of the latest linguistic theories, what forms the basis of a semantic characterization of a language are statistically determined semantic regularities, which is to say correlations between expressions (sentences) and the conditions systematically accompanying their uses (Ziff 1960). One identifies a set of semantically relevant circumstances associated with a given sentence by eliminating as irrelevant the conditions that accompany any act of linguistic communication (such as vibrations of the vocal cords) and ignoring random correlations (such as between having a philosophical discussion and using the sentence 'Every bachelor is unmarried') by appealing to structural similarities between sentences. Then, in order to establish the meaning of a component expression, one compares this set of semantically relevant conditions with sets of conditions accompanying sentences that differ from the sentence under consideration only with respect to one component expression, and with sets of conditions associated with sentences containing that expression.

Critics of this account complained about the vagueness of the notion of accompanying condition and pointed to serious problems with eliminating semantically irrelevant conditions (Tartaglia 1972: 179-186). From a philosophical point of view, something else appears to be a much more fundamental shortcoming. Namely, the account relies on an assumption that there are statistically relevant dependencies between the meanings of linguistic expressions and the circumstances of their use. Clearly, sentences such

as ‘This is a dog’ do not raise any doubts in this connection. In the general case, however, the assumption is unacceptable for the simple reason that people do not only talk about objects and phenomena in their immediate vicinity, however broadly construed. The author of this conception is well aware of this: he predicts that it will be impossible to establish any semantic regularities for a considerable number of sentences, and recommends that such sentences simply be omitted. But what are the grounds of his confidence that, for any language, one can find a sufficient body of sentences exhibiting such regularities? Just like in the case of the previously discussed position, this claim is a generalization of observations about known human languages. In both cases, there is no general law to warrant this generalization; because the generalization is based on a non-representative sample of the class of possible languages, the procedure the generalization supports is methodologically unsound. Perhaps it would be profitable to count this procedure among practical decoding techniques, its use being fruitful on the condition that its scope of application be checked and delimited by the researcher’s knowledge and intuition.

One might now ask: What type of semantic decoding procedures for natural languages would be immune to this kind of objection? Well, such arguments do not undermine methods based on dependencies that are guaranteed by the definition of the concept of meaning. Furthermore, it seems that, notorious as the various debates about the definition of meaning might have been, one can identify some dependencies that a vast majority of experts would regard as *ex definitione* semantically relevant.

One such dependency, with a caveat I shall formulate below, is the frequently emphasized connection between the meaning of a sentence and the conditions in which the sentence is assented to or dissented from. The method Quine devised for discovering the meanings of linguistic expressions that exploits the notion of stimulus meaning relies precisely on this dependency (Quine 1960:31f). Two sentences are stimulus-synonymous if and only if the stimulations (kinds of events) that prompt the speakers of a given language to assent to (dissent from) one sentence prompt them to assent to (dissent from, respectively) the other sentence. Assuming that the meaning of a sentence is determined by a pattern of stimulations prompting the speakers to assent to the sentence and a pattern of stimulations that prompt the speaker to dissent from the sentence, and drawing parallels of the kind described in Ziff’s theory, discussed above, one can attempt to establish the meanings of a sentence’s component expressions.

One of the most serious objections raised against this account is

the observation that stimulus-synonymy is a necessary, but not sufficient condition of synonymy in its everyday, intuitive sense (Tartaglia 1972: 145-146): if a person knows that the morning star is the same object as the evening star, then the sentences ‘This is the morning star’ and ‘This is the evening star’ are stimulus-synonymous for her; so if all the respondents know this, then Quine’s criterion of synonymy fails. Therefore, one can only accept it on the condition that the criterion be applied when it is guaranteed that no extra-linguistic knowledge will interfere; alas, the condition is impossible to meet. Moreover, the criterion enables one to discover, at the very best, the meanings of linguistic expressions that are closely linked with sense experience: it is useless when it comes to sentences containing non-ostensive terms.

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Let us return to our utopia. The Researcher acted on the assumption that reception of a linguistic message brings about a change in the ‘internal state’ of the hearer, which we ordinarily call acquiring the belief that whatever the sentence asserts is the case. Given universal confidence in the interlocutor, the truth of this assumption would be guaranteed definitionally. We have also supposed that the Researcher has access to other people’s beliefs: he can reconstruct those beliefs in his native language on the basis of the behaviors of the people under observation (and, perhaps, his knowledge about their system of values or the hierarchy of their goals). This last supposition seems to be very strong, yet it is very often relied upon in the humanities. In fact, it seems unavoidable given what we want to accomplish; the conception of stimulus meaning provides a case in point: without knowing our respondents’ beliefs, we cannot establish the meanings of sentences, which the respondents assent to or dissent from in light of the types of stimulation we know.

How can we exploit our Researcher’s methodological ideas if we waive the assumption of universal mutual trust? For, in natural conditions, a change in ‘internal state’ that corresponds with comprehending somebody else’s utterance consists in a play of imagination rather than a modification of the set of one’s beliefs: having understood a sentence, one realizes what would have to be the case if the sentence were true, but one can remain non-committal about its truth-value.

A linguist has very limited access to the sphere of mental lives of the speakers of the language under investigation (and, arguably, before he

can communicate verbally with them, he has no such access at all): in this case, the most he can hope to accomplish is to establish the meanings of ostensive expressions by way of applying criteria such as those envisaged by Quine. In his attempt at providing a complete semantic description of an unknown language, a researcher, it seems, has to start out by following in the footsteps of the Researcher: he has to work under the assumption that all the sentences whose use he has registered are assented to by the hearers, and then try to assess the influence of the utterances' reception on the hearers' beliefs. He will later verify and correct the tentative translations of sentences into his native language that were based on this assumption, discovering inconsistencies or incompatibility with new data, but as a starting point, this assumption is his only chance at success.

In fact, the assumption in question has a similar role in the semantic reconstruction of a language to that played by the supposition that no recorded utterance is deviant in syntactic description: a researcher's initial hypotheses regarding grammaticality rest on precisely this supposition; only later can any corrections be made that result in treating part of the collected language material as 'damaged goods'.

The practical successes of real-life researchers in describing the semantic properties of previously unknown languages seem to speak to the approximate truth of the initial assumption that people believe what they hear. Since naive people appear to be a minority, perhaps the majority are those who are earnest and accountable for what they say.

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