

Philosophy of Language and the Feasibility of MT:  
A Position Paper

by

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If this contribution to the project is to be considered a kind of crucial insight to be provided by the present author representing philosophy to the question of the feasibility of machine translation, it will, I fear, be a disappointment. The most important reason for this is, I think, the perhaps embarrassing, though by no means obvious, consideration that the concerns of philosophers with the problems of language intersect with the issues important to machine translation only tangentially. In stating this position, I indicated that this relative lack of relevance has not always been obvious. Subsequently in this essay, I shall be able to illustrate this in particular cases. For the present, I think it will suffice to indicate the illusion of greater relevance than I believe in fact exists comes about from the habit of philosophers generally to speak in terms of extreme generality and at least partly as a result, to avoid consideration of those little pragmatic factors which usually distinguish success from failure. A successful marriage tends to be for a philosopher, either an arrangement in which some aspects of the relationship are satisfactory, thus making successful virtually all of those that end in divorce, or to be one in which each partner plays his role in an ideal fashion, a view which rules out virtually all existing ones. Since the philosopher usually neglects to make clear the highly systematic character of his terms, one can easily be misled into assigning far greater practical consequences to his conclusions than they warrant.

For openers, one might point to peculiarities of the translation situation which would seem to make machine translation in principle

impossible. If one views the purpose of translation to be the production of a text in the target language which will be of the same approximate length as any arbitrary text of the source language and will share with the source material all features of a semantic and pragmatic character, will inform with respect to the same features and suggest the same features to the same degree, there is every reason to doubt that machine translation is possible. No program, suggested or in project, or any theory of how one might be constructed, has even the remotest hope of accomplishing this. Before however one yields too much to despair because of this, it should be pointed out that this result holds equally well for human "normal" translation as well. The present author is quite familiar with both Dutch and English and has indeed translated material between these languages professionally. The requirement outlined above in this case would however require being able to convey in a few words such subtle cultural features in the Dutch as their peculiar love-dependence-fear relation to the sea, the effects of high population density and the oddities of periods of Frisian cultural dominance and inferiority, to mention but a few. Since these features can scarcely be explained adequately in a full sized book, it follows trivially that short passages dependent on them cannot be translated at all in the intended sense. And this in a pair of languages extremely closely related. The point of this is not of course that translations cannot be done at all, but this particular "strong" sense of translation represents an ideal extreme which can only at times be realized. Now of course for some cases even this extreme can be realized and indeed by computers. The existing program at the Linguistics Research Center when provided with a standard Dutch-English glossary (provided this contains standard mathematical terms)

and even a relatively partial syntax would have no difficulty translating in this "strong" sense page 7 of volume IV of the ENSIE encyclopedia (this is a portion of an article on set theory).

The difficulty with much, perhaps most, talk concerning machine translation by philosophers (and not only philosophers) is that so much of it is devoted to the problem "in principle." Thus Herbert Dreyfuss, holding phenomenological views of human intelligence, argues from the intentional nature of human language to the impossibility of translation by machine. Here our examples are, I think, instructive. In the phenomenological sense "intentional" phenomena covers a large range of psychological data, including on one hand processes known to be strongly rule governed to processes whose nature we have difficulty in formulating even for purposes of identification. As a result the encyclopedia page cited above is as intentional as the most difficult culture-specific poem. Yet as I indicated above, the problem of satisfactory machine translation of the page in question may safely be regarded as solved. It follows then that the argument establishes the untranslatability by machine only of those kinds of linguistic material whose intentional character cannot be approximated by a machine, from which follows that

- (1) Not all linguistic material can be translated by machine--  
a conclusion consideration of human translation causes us to be willing to agree to even without the argument, for reasons we have cited, and
- (2) Those passages which cannot be machine processed cannot be translated by a machine.

On the other hand we have arguments based on a very selected corpus of sentences combined with a limited glossary which, by identifying

the familiar with the universal create the impression that relatively simple grammatical analysis together with a simply structural dictionary will suffice for the task. The impression thereby created is that context dependence is limited to what is involved in transformation grammar and the resulting ambiguities resolvable by dictionary rules of agreement. This attitude is for instance implicit in the discussion by Jerrold Katz. And, indeed, so they are, in a great number of cases. What is ignored here is that this common means of reduction of ambiguity is but one of the linguistic devices for this purpose. Even worse, this view requires that that there be discrete senses of words leaving us in a quandary as to whether e.g. bachelor = unmarried male and bachelor = cheerful fellow constitute one, two, three or perhaps even more senses of bachelor. It does not require much ingenuity to argue for any of the possibilities.

Essentially what I have been arguing here is that what philosophers of language have had to say about the possibility of MT (directly or by implication) are largely or completely irrelevant to the question of the feasibility of MT in the sense in which this question is of importance to MT researchers and users. (A partial exception must here be made with respect to Bar-Hillel, primarily because he has generally been concerned with the pragmatic, rather than the "in principle" questions.)

Now if the argument I have been advancing is correct and we cannot expect solutions of the feasibility problem from the philosophers of language, it does not however follow that these will have no contribution whatever. In a certain sense, the contribution that I foresee does not differ in its most general description from that which one might expect of theoretical linguists, although due in part to differences of professional emphasis, there is reason to suspect that these will differ in

exact content. More specifically:

1. Since there are parts of language for which the MT problem is relatively simple and definitely feasible, it is to devise general description, or models, of these situations and to do so in as general a manner as possible. Some of this process is clearly grammatical and lexical, but at least part of it appears to be the same as, or very similar to, what has been termed logical analysis. In both the linguistic and logical areas, it is likely at this point to appear to the unsophisticated to be simply a matter of description, but in both we have found that the facts, at least as far as they are known, can be described in many ways, some indeed more promising than others. This process consists not infrequently in the embedding of the linguistic phenomena in a larger whole and in many cases can be helpful in pointing out the possibilities of useful "normal forms" for the purpose of representing information within the computer.

2. Since, as we have seen, certain linguistic phenomena make excellent translation extremely difficult and in some cases de facto impossible, whatever may or may not be the case "in principle," relative success in mechanical translation is very likely to depend on our ability to understand what these phenomena are. This is so, not only in allowing us better to estimate what it is simply uneconomic to try and dishonest to promise, but also because it may give us convenient guidance concerning useful modes of man-machine organization. Let me illustrate this. Most MT programs depend critically on a lexicon which in one way or another contains semantical and usage context notes. The normal way in which this information is used is to systematically utilize agreement information together with perhaps some additional information explicitly fed in--e.g.

this is an article on petrology: dialectal readings will be improbable. One kind of application which occurs with some frequency in language use (although certainly more common in verbal than written language) which is usually completely ignored is the use of earlier passages to help indicate the meaning of later ones. In normal use the mechanism is apparently not usually a direct effect linguistic context matter, but rather seems to work by modifying the expectations of the hearer/reader. This observation suggests on one hand the possibility that some improvement in ability to interpret and hence presumably to translate may be achieved by assigning and in some way modifying probabilities of one reading over another. Unfortunately at the present time, our knowledge of anything beyond the general outline of this interpretive process is so slight that it is difficult to even begin to answer the questions that must be posed before we can use it on a machine. For example, presumably if this technique is to be used we need to attach to our glossary initial probabilities of readings. How do we get them? Do we scan a large corpus? Ask specialists? Ask "men on the street"? Once we have them, how strongly should a confirmed "improbable" reading modify the probabilities? Finally, it appears pretty clear that any such modification should degrade to the normal probabilities (assuming we have them) with the passage of time. But how fast should this occur? In short considerations of the phenomenon and its apparent structure tell us in a rough way what we would need to do to implement this and also specifies a large number of difficult problems which would have to be overcome to do this. But there is at least one additional advantage that can be gotten out of this consideration. Suppose we wish to seriously consider having our translation procedure accommodate the feature we have been discussing but are

pessimistic about our ability to easily overcome the difficulties indicated. This raises the question as to whether we might not be able to get part of the advantage with the help of human intervention. If we look into this problem, we can conceive of at least three possibilities. We might as a variant of pre-editing have an expert call out unusual readings in advance. We might have the machine call out alternatives not determined by agreement and dominance rules. Finally, we might have either a lay reader respond to the output indicating which readings appear wrong or an expert reader compare the input and the output. Assuming we wish to explore one of the latter two alternatives, say even the last one, it is clear if we are going to accommodate our phenomena that we will be going into a mode of man-machine cooperation in translation which has rarely been considered. That is, instead of construing the function of the operator as primarily analogous to that of a normal editor, he will, by virtue of the fact that his remarks (to have the effect indicated) must be fed into the computer's lexicon in some appropriate form and modify the computer's, presumably second-pass, output, become part of an iterative loop with the computer. How practical this alternative may be I would not at the moment presume to guess. It does however illustrate one of the possibilities for further development. In passing it is worth noting that this (in common with several other ideas which I suspect will be worth examining in the next years) represents an abandonment of the picture of MT which has been more or less dominant: namely, the picture of a process in which human participation is limited to the design, but is excluded completely or present only at the fringes of the operation of the system. There is of course no reason to conclude from the obvious desirability all things being equal of such an arrangement to the conclusion that if such a



system either cannot be designed or (more accurately) if designed is only of limited use, that the possibility of computer participation in translation ought to be abandoned completely, any more than the unfeasibility of completely eliminating human interaction on tactical data systems leads to the corresponding conclusion.

In concluding my discussion, it may perhaps be worth while for me to indicate those features of language processing concerning which I believe there to be some reason to hope for some contributions from general or philosophical considerations of language to MT--perhaps it may now or soon be advisable to signify the position I am taking, in this respect in agreement with a growing number of people, among others Bar-Hillel and Kay, by re-christening it as machine assisted translation.

1. I think that there is likely to be some advantages to be gained from systematic work on question answering models, both the logically oriented projects based upon the predicate calculus or combinatory logic and the more linguistically oriented ones.

2. The information incident to the performance of certain types of linguistic acts, most especially those of the type Austin terms illocutionary, frequently provides special uses in the interpretation of utterances. Since certain verbal forms are associated with these, in any event typically (it is much more difficult to argue for invariable connections here), one can see the potential utility of the translation program making systematic use of this. Some of the basic linguistic work incident to this is being pursued. If useful in MT, one would anticipate that it would be so primarily in creating greater flexibility in definition of the relevant context. There are indeed many problems, including the

strong likelihood that illocutionary acts are rather strongly culture dependent, so that it may be that then, for instance may perhaps be no equivalent illocutionary act in a society without feudal antecedents of the giving of ones "parole" or "Ehrenwort". Even this type of situation might however enable (assuming one could find appropriate ways of storing and referring to the information) improved disambiguation, such as perhaps avoiding translating the Dutch "Wees een heer in de verkeer" (a safety slogan meaning "be courteous in traffic") as "Be a man in traffic." In passing let me remark that the implicit identification of illocutionary acts with pure performatives (i.e. locutions which in the first person per se perform the act to which they refer, such as "promise") which plays a strong role in Austin and some of his followers seems to me probably misguided. I note that Alston appears not to do this--and that an enumeration of illocutionary acts is in my view an outcome and not an input of a theory of illocutionary acts, certainly of one likely to be of use.

3. As I indicated above, the phenomenon of use of an expression primarily or exclusively to alter in the succeeding context appears to have some promise for MT (as I indicated above). It should perhaps be remarked that this appears to be closely related in many applications to the disambiguation processes connected with specifying the subject-matter.

4. Finally (for the present purpose), there is the phenomenon in which the hearer (or reader) expects under normal circumstances the speaker to be reasonably attempting to fulfill his apparent purpose--to inform about the matter at hand, to help solve the problem, to induce the behavior he wishes, or the like, as the case may be--and interprets his utterances accordingly and furthermore the speaker relies on the expectation that the hearer will do so. (In a somewhat oversimplified description, Bar-Hillel

has recently referred to this as the requirement of the "good will" of the hearer.) Among other things, this results in the strong tendency to reinterpret apparent tautologies like "men are men" as non-tautological. This is of course related to the phenomenon discussed under item 3. It should be remarked that this phenomenon is by no means limited to the assumption that the speaker will not gratuitously contradict himself--although it includes this--but also that he will on one hand agree with the information both he and the hearer accept as "obvious," but even that unless there is some doubt about it, that he will not state the obvious. Because this extremely great burden of knowledge about the world which this would appear to place on the computer, this phenomenon would appear to rule out MT irretrievably (and, in private conversation, Bar-Hillel has recently expressed himself along these lines to the present author). That the situation is not clearly quite this bleak appears to me to follow from the following considerations. Firstly, the material of primary interest for MT--in particular, scientific articles and the like--may not be quite as open-ended as all that; the example of the encyclopedia article shows in any event that there are times when it is not. Secondly, when the translation occurs between related cultures, the process may frequently have only secondary effects since the interpretive process in one language will then simply parallel that in the other, reinterpreting and disambiguating usually in exactly the same way. Thirdly, this process and the related one referred to under item 3, can not infrequently function to "save" what would otherwise be a poor translation. For example, translating the English "I'm sorry" into Dutch as "het spijt me" (which indicates substantial regret and not mere simple apology) in circumstances of simple apology, usually does not occasion any misunderstanding (since

the normal interpretation gets rejected as inappropriate). We accordingly get a non-colloquial translation which in terms of information conveyed remains adequate. Finally, the possibilities of human interaction to provide the required information on an ad hoc basis, either by intermediate discussion or by the kind of successive attempts editing discussed above may be of substantial help. Accordingly, the phenomenon ought to be rather the occasion for more intensive research.

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