ESSAYS ON LANGUAGE, COMMUNICATION AND ECONOMIC THEORY

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SYNOPSIS FOR PROPOSAL OF DOCTORAL DISSERTATION

Economics as a discipline has epistemologically two roles in the present and upcoming decades, i.e. of probing and answering questions of economic affairs, and second, and more abstractly, as a mode of tools and analysis to better understand a broader set of ideas across disciplines. The latter means it is flexible enough to absorb elements from other sciences and social sciences, which has already become apparent in the fields of Evolutionary Biology, Artificial Intelligence and Machine Learning, and the focus of dissertation, Information Theory and Linguistics (including Philosophy of Language). This intermingling of disciplines makes both fields better off, where linguists can take advantage of strategic interaction, optimality and efficiency results while we can incorporate theories of communication and language from them. It is my personal opinion that the world is offered to us as it is, the fields are artificially constructed and in their rigidity, we miss out on some potentially important discoveries. It is with optimistic observation of seeing the walls among disciplines break, that has inspired me to work on a dissertation across disciplines.

Language is the mechanism through which humans communicate. Without some form of Language, no interaction at the present scale of economic affairs would have been conceivable. Not only do we communicate in language, but we also think and learn in terms of language (Whorf – 1956; Wittgenstein – 1921). Economics despite its affirmation as the 'Queen of Social Sciences' has neglected delving into linguistic effects on economic behavior. The Present treatment of communication has also been fairly recent, with Spence's theory of costly signaling, and game theoretic models of costless signaling, after the seminal work of Crawford and Sobel (1982) and follow up literature dubbed as Cheap Talk games. The framework of these games have their roots in Lewis' Sender-Receiver games (1969) where the sender observes a state, sends a message, the receiver takes the action conditional on the message which affects both their payoffs. Many leading economists as well as from the outside have voiced concerns of treating communication among humans in a model of 'Animal Communication' (Lipman – 2009; Rubinstein – 2000) the primary argument of which is that such games are mostly concerned with the strategies associated with a message rather than the content of the message which under a linguistic signal can have varying effects apart from what the papers suggest.

With the aforementioned motivations in mind, my dissertation would be a compilation of essays on classic problems of Microeconomic theory with language as the mode of analysis. Since Language and Linguistics are as broad a field as Economics and deals with subject matters relating to Speech Patterns, Etymology, Sociolinguistics, it is to be made clear at the outset that before such an analysis, a theory needs to be established to make concepts from such theories amenable to economic analysis. This means two things: -

1. Language as studied in 'Language and Economics' domain under cultural and social economics, a survey for which is given by Grin (2009) deals with sociolinguistic aspects of language in economic life, for example differential wages of Francophones and Anglophones. However, the treatment of language in my dissertation would be a complete abstraction of language, drawn from linguistic philosophy to conceive of a language which can refer to a natural language, an artificial language, or even a non existent language abstraction, as the analysis deems fit.

2. Though my proposed dissertation is closer in spirit to Marshack (1965) and Rubinstein (2000), who have tried to analyze aspects of Language efficiency and analysis through economic methods, it is not what my dissertation proposes to study. The work which is closest to my objectives is "Is Language vague" (Lipman, 2009), but as discussed above, it provides a framework developed in the style of Cheap Talk literature, and itself concludes that the quirks of linguistic effects on information transmission can at best be studied within a boundedly rational model.

DISSERTATION OUTLINE

The first section of the dissertation would outline aspects from linguistic theory to define an abstract conception of language, and how it relates to notions of data, information, knowledge, technical proficiency, wisdom and practical usage. It will elucidate how language can treat these processes relatively to signaling theory. For a formalization of language, it is imperative to be aware that this is not an end but a means to study market outcomes and behavior, and hence only aspects of linguistics which are general and applicable would be used for analysis. Philosophy of language is useful in this aspect, particularly those of the philosopher Ludwig Wittgenstein, notwithstanding some of the most insightful views of language but also because his work transitioned from a purely logical conception of language in his early work (Wittgenstein - 1922), to the strict rejection and more naturalistic view of it in his later work (Wittgenstein - 1953). The formalization of the two models would provide us with the option of comparing statics to providing a dynamic model of language evolution[1] from the former to the latter, and its welfare effects on the market participants. Other aspects of Language philosophy and Linguistics would be borrowed from the works of Pierce, de Saussure, Chomsky, Frege, Russell and others to create a simple but hybrid conception of language which embodies information and knowledge within its structure.

After the conception of a linguistic model for economic agents, the dissertation will apply it to three classic problems in Information Economics literature (though other fields are not yet excluded). The following sections will will cover each of these.

THE MARKET FOR EXPERT SERVICES

Certain markets for expert services such as for medical treatment, legal consultation, car repair, financial services etc. pose problems on account of the large information asymmetries between the sellers(experts) and the consumers. Darby and Karni(1973) labelled them as **Credence Good** markets, where unlike experience goods, the quality and quantity of treatment cannot be verified even post-transaction. Dulleck and Kerschbamer(2006) in their analysis and survey of articles pertaining to such literature point out that price signals fail to transmit information about the parameters and tend to be flat among poor and good experts alike. The Experts can take advantage of the information gap and hence are incentivized to deceive particularly the less sophisticated or naïve buyers.

While Dulleck and Kerschbamer(2006) do suggest that to minimize the probability of being deceived, one has to end up choosing the busiest or an expert who charges a premium,

[1] Language here would be defined as a 'market language' – An abstraction which assumes that if the analysis is of a market, then the world is divided into two ontologies, where each ontology would be described by a language. So for the real world which encompasses the Economic world a natural language – English, and for the participants of the market, a language which describes their ontology better than the vague natural language. We will call this language "**Oikos".** It is important to note here that "**oikos"** is a specialized language projected in the natural language. For e.g. The word Equilibrium exists both in real ontology and Economic ontology – but might mean completely different things in each specification.

they do not account for that when experts do have a capacity constraint, their incentive for putting less effort per consumer increases. In fact, as has been empirically shown in health markets of developing countries where public hospitals can at most give 3.2 minutes on average per patient (Das et al, 2008).

The first essay proposes to analyze such markets where I assume that all market participants (buyers, sellers, intermediaries) are distributed spatially according to their proficiency in that market's language. So if L is the market language, the market participants are identified on the basis of their endowment of L in the static game. The experts are assumed to be 'trained with certification' and the only way agents can learn the language is by experience. The spatial distribution makes this model one with vertical differentiation, but since the consumers cannot distinguish the seller's type (given that all sellers speak better than the consumers) or do so probabilistically, this makes this model one of a horizontal distribution in terms of the consumers. The equilibrium of the model will be determined with the hypothesis that less sophisticated consumers are matched with poor experts. In the dynamic model, the language rules are no longer fixed, with mutations on words and grammar, in an evolutionary model. The hypothesis then is whether over time, a specialized language is meant as a barrier for consumers to counter the experts' incentives for fraud. The model can be extended from a single dimension of language proficiency to a bilingual environment, making this a two-dimensional problem with added complexity. The roles of intermediaries as those consumers with a 'working knowledge' of the language through experience would be pivotal in search efficiency.

CAN NO KNOWLEDGE BE BETTER THAN SOME KNOWLEDGE (IN THE MARKET)?

> Before I started the practice, a mountain was a mountain and a river was a river. When I was deep into the practice, the mountain was no longer a mountain and river was no longer a river. Now that I have mastered the practice, a mountain is a mountain, and a river is a river.
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> -Buddhist Zen Koan

This paper applies the classic Whorfian hypothesis of the causal relationship between language and thought which was earlier stated by Wittgenstein aphoristically as "The Limits of my language means the limits of my world" (Wittgenstein – 1922:5.6). This builds on the idea that language doesn't just express thought, rather constitutes it. This paper formalizes de Saussure's (1916) conception of the syntagm and the paradigm, and concords it with Shannon's (1948) theory of valence. The intuition is that what differentiates a formal language and a natural language, where the former is projected in terms of the latter is that it is more 'precise' in its vocabulary and grammar rules, that is the number of referents a word has is reduced and is usually one. Such a formal language becomes binding on the combinatorial possibilities of words to form sentences, and parallel conception in the ontological space means a 'narrow outlook' of the world. This is of course not true for all the experts of that formal language, but for the beginners. For example, a layman is not constrained in his speculations of his observations say in light of the economic crisis (whether he is right or wrong), but for an economics undergraduate who has training in basic economics (colloquially termed Economics 101), would not only try to fit the crisis in the mold of his training, but would rather be confident about it. But for a veteran economic theorist can invent new rules to explain the crisis, guided by experience and knowledge. The formalization of this hypothesis is the object of the second paper.

The formalization of this idea can be applied in varied ways, one of which relates to the previous paper on market for expert services. The mechanisms of this is that the naïve

consumer[2] matching with automatically the busiest expert while the slightly more informed trusts his judgment which in a 'lemons market' scenario can prove disastrous. The second mechanism is that in the interaction process with the expert, given that the expert gets the signal to put more effort in forming the interpretable linguistic message but for the intermediate, the expert sends a precise message in the market language which the intermediate might not interpret. This can be formalized using the wisdom and technical definitions in terms of language as mapped out in the first section. In a flexible grammar approach, training does not imply wisdom[3]. So the knowledge of grammar doesn't mean its usage and a complex signal hence wouldn't be interpreted in the duration of interaction.

VAGUENESS AND PRECISION

Economic interactions and transactions are expressed through natural language which as has been established is vague. Lipman (2006) provides an excellent study on whether being vague than precise is 'monotonically bad'. The answer is obviously no. Depending on context, the interacting agents, and other factors, vague language can not only precisely transmit information in lesser effort, but can bypass rules to present a simplified approximation of the complex information signal. (For example, metaphors and analogies). However, the simplification of language in sense of Ockham's razor (Say a popular book on Quantum Physics for the mass market), definitely has strategic considerations, or as Crawford and Sobel propose that partitioning can reveal an informative equilibrium in cheap talk. These issues apply to how language is used, that is concerns Pragmatics. Since each word in a vocabulary ascribes a network of meanings, usually correlated with one another[4]. With all these points under consideration, and factors such as the costs of precision, strategic considerations and the linguistic model described above, a strategic information transmission of the spirit of Crawford and Sobel(1982) would be studied under natural language interpretation of message states, in what Lipman(2006) conjectured for the ideal bounded rational study of vagueness.

THE BILINGUAL GAME

This essay provides a theoretical reasoning of why some natural languages fair better amongst others in terms of the market language. Suppose if L is the language of economic agents, representing concepts in the totality of factual and counterfactuals of its sentences, and two natural languages say English(E) and French(F). The question is whether the two languages can equally project L? These two languages should fulfil some base requirements, that is to describe the ontologies of the real world in the dictionary sense. Once both languages fulfil the criteria, then the hypothesis can be tested. The intuition is that L can then be projected in both E and F, but once the rules and vocabulary are not fixed, the use of the language would mean that L will itself change(mutate) in the long run, where the frequency of use of L in terms of E or F will determine the mutation. Since L is expressed in natural language, new concepts in L would emerge in the natural language of E. So that in the conversation between E and F, the speaker of E would be better able to communicate L, rather than F who would then have to learn E apart from L in terms of F. This paper outlines the social dimension of language and pragmatics. This paper would be in similar lines in the idea to the one by Lang(1986) who uses a transaction costs approach and not an informational one to show how a language can be discriminatory.
Other games and ideas such as the Chinese Whispers game of message distortion over multiple agents transmission, the problem of information cascades and herd behavior and

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[2] I prefer to use the term 'rationally ignorant' or 'rationally submissive'

[3] We can assume technical training provides wisdom although at a fractional increase compared with experience.

[4] Wittgenstein(1953) called these Family Resemblances

Linguistic analysis, and other questions would be considered as avenues for further research.

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