Naming and the management of social interactions

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Abstract

This paper advances the hypothesis that lexical semantics is handled through two different kinds of processes. The first deals with basic categorization while the second deals with words meaning in context. In order to distinguish the two processes I attempt to clarify what it means for humans to be motivated by the context, rather than just by perception, when naming. I argue that the role of the context in comprehension and production of words must be accounted for through a specific capacity whose goal is to manage social interactions.

Introduction

Development in linguistics and language processing lead to think that in order to pass the Turing test, AI must implement the cognitive competence and principles that ground pragmatics. On the other hand, the cognitive revolution has set the challenge for linguistics and psychology to specify its theories in such a way that they could be implemented in any computational device. In this paper, I attempt a first step towards the specifications of ideas related to pragmatics and philosophy. My strategy is to argue for a theory in cognitive linguistics while tempting to always have in mind the computational specification requisite. The theory, crudely, is that word comprehension and production are handle at two different levels of computation. The first level is mere categorizing and allows recognizing the things for what they are, the second level uses the categories of the first level plus the context for interpreting and producing words. I believe the first level is adequately described by some kinds of procedural semantics, initialized with multimodal input. The second level computes the mental operations analyzed by pragmatics. This level is far from being well understood. I will advance the hypothesis that the computation taking place at this level are goal oriented, the goal being the management of social interactions.

Two facts concerning the act of naming

The object of this paper is the categorization made using words or full sentences. We call 'naming' the action of categorizing with language. Naming, thus, is attributing a term or a string of terms to an object in the world. Naming is categorizing, since it is subsuming a singular object- the object named, under a category- the one constituted by the objects that can be labeled by the name. Naming a thing with the name 'X' is categorizing it as being a X. For instance, talking about ‘the duck next to the tree’ is classifying something in the class ‘ducks next to the tree’. More generally, to speak of things, in whatever way, is to speak of them as instances of some category. Yet, naming is a very special case of categorizing act. Most animals categorize all right, but they cannot name the way we do.

AI, in its attempt to model human cognition, has given much attention to empirical data. In order to allow further applications of this method, that I believe to be right and fruitful, I want to make two rather simple observations on the specificity of naming compared to simple categorizing. The next two sections will be consecrated to show their relevance for the modeling of linguistic categorization.

The first observation is that ***naming is a speech act***. It is the result of an utterance, or of some other use of language (such as writing). Let us call 'mental representation' the psychological cause of an individual's act of categorization. Current theories in cognitive psychology and AI model mental representations with prototypes or exemplars, or other theoretical objects that allow to categorize a possibly infinite set of occurrences answering specific criteria in a single category. What distinguishes naming from other categorizing actions or processes, however, is that mental representations are associated with names. The relation between names and mental representations is such that when hearing a name, we understand what is being talked about and, conversely, the name of the thing comes to our mind (is made available) when required, and in particular when we want to talk about that thing. My mental representation of a chair, for instance, is the cause of my qualifying such and such objects, rather than others, as chairs. It is also what allows me to understand someone talking about chairs. The relation between names and mental representations thus involves 1) names as public representations (sounds or writings), 2) the things being named, 3) the mental representations of the names (which allow for the recognition of texts and utterances as such) and 4) the mental representations of the things being named (which provide meaning to the names). The point I want to make here is that naming has to be distinguished from other kinds of categorizing actions (such as perception), because it involves entities, names and their mental representations, which are specific to it. Moreover, names are fully involved in the processes of categorization. They are not, as is sometimes thought, innocent, neutral, uncolored things, mere labels that do not intervene in any way on the category of things being labeled. Names, it must be remembered, belong to language. As public representations, they are produced by people wanting to communicate, and thus to produce an effect on the audience.

This leads me to the second observation: **the acts of naming are learned through, and used for, social interactions**. This is because language itself is learned through, and used for, social interactions.

Categorization has been mostly thought as the result of individual, psychological, processes only. To be sure, categorization is indeed primarily the result of individual mental/brain processes. A goat, for instance, need not be particularly learned or socialized in any way to recognize grass and classify it as 'good to eat'. Naming, however, is a specifically human classificatory act that involves social processes. We are taught how to name things and, more generally, we continuously interact with others using names in communication. Since naming relies on social processes, it may be fruitful to catch a glance at them in order to model the naming process.

First, the social processes that allow us to learn names: these areostension and characterization.

Ostension consists in showing an object (or pointing at it or directing attention toward it in any way) and, at the same time, naming it. Thus to my young son who is learning to talk, I point at a duck and say: "Duck! Look at the duck! That's a duck!" Note that the ostensive process is not bound to physical entities. It may also be used for abstract entities. Addition is learned through ostension (and not thanks to Peano Arithmetics), children are *shown* how to add numbers. Ostension provide the learning system with multi-modal input: a label on the one hand (written or uttered string of words), and perceptions of the things that fall under the label on the other hand.

Characterization consists in creating a specific relation between a word, or a string of words, -the characterized- and another string of words -the 'characterizer'. A definition is a characterization which has the ambition to be complete: nothing needs to be added to the characterizer for pointing at the characterized thing. A description is also a characterization insofar as the objects entering the process of description are words only. Thus a definition of 'duck' is of the kind " swimming-birds of the family Anatidae" and a description of ducks is of the kind: "ducks are palmed feet birds". Here, definition and description are of the same type: they fix constraints on how to use words (the meaning of the words) with the means of other words. A description that is made of an object in the presence of it, pointing at its different parts for instance, is, on the contrary, a process of ostension. It is a multiple ostension process where parts of the object described and their relations are named: they are pointed at and at the same time string of words are uttered. There is much discussion over the logical status of definition and description, but I am here only interested in the social facts that cause a language to be learned and that engender the competence to name. This is why I have distinguished ostensive and characterizing descriptions in the unusual above way. The common intuition is that definition is about words while description is about the things named by the words. Characterizations seem to fall under the classical distinctions between analytic (definitions) and synthetic (assertions about the world). Quine (1953), however, has shown that the distinction is not so much grounded. In our case, whether synthetic or analytic, characterizations are, for the learner, prescriptions on how to use words. In the analysis of the social processes, we see that the characterizing process is to draw the attention of the audience on a pair whose elements are string of words (definiendum and definiens or the name of the object described and the description) and the ostensive process is to draw attention on a pair whose element are an object and a string of words (the named object and its name). This way of distinguishing the social processes that engender the ability to name is important because it allows to distinguish what is the

input for the learner: (string of words, string of words) or (perceptions/sensations, string of words). In the next section, I will analyze the respective causal role of these distinct inputs on naming. I will argue that ostensions are input for devices that categorize, while characterizations are input for the formation of background, contextual, knowledge.

But let me continue to observe the social aspects of naming, for they do not end with the learning processes. It is not that once the learning is finished, the social processes have done their cognitive job and can be dismissed. Naming is used for communication, which is itself a social process. Communication as the essential function of naming, direct the act of naming. For instance, when naming, I will pay attention to the expectation and knowledge of the audience. If I am asked, as a wine taster, what is this liquid, my answer will be of the kind "Cahors, crû 1975", but if I am asked by a young child who wonders at the red color of my drink, I will say "it's some wine". This constant requisite for relevance and efficiency of the acts of naming has further implications. Because people want to be credible, they will tend to 'speak the truth'. That is to say that their naming actions will be in accord with what is taken to be true by other people (and more particularly by the audience). Otherwise their naming actions will not be taken seriously, they will have no effect on people. There is an implicit claim to truth in naming, it is a claim for objectivity (or intersubjectivity), it is a claim for social recognition. This implicit claim to truth is made manifest by the fact that every act of naming can be the target of criticism by others, a criticism that takes the form of a judgement of truth. There is constant pressure from other people on the way we use words. A person who names incorrectly will be said to be a liar or an incompetent. He will thus be penalized by other people. If my answer to the liquid tasting in the wine tasting situation were "wine", I would be judged to be a stupid ignorant and loose my credibility. Likewise if I say "Côte du Rhône" instead of "Cahors". We touch here an essential property of language, namely the normativity of meaning. Normativity is in action in the learning process: we *correct* learners so that they name properly. We say "no, it is not a duck! It's a goose". Normativity is still present in every act of naming. This means that when we name, we must take into account the expectations and knowledge of the audience and the current theories which may have an impact on the interpretation of perception.

In brief, I pointed that the following social processes are deeply involved in naming.

Socialization: We are taught by other people how to name things, and we teach to others, children or students for instance. The teaching is done through ostensions and characterizations.

Normativity: The normative processes have the form of truth requisite and relevance (with regard to the audience's expectation) requisite. Normative processes concerning truth are engendered from the fact that naming something 'X' can be in accord or not with what other people understand of what it is to be an X and thus qualified to be correct or incorrect. Normative processes concerning relevance are engendered from the fact that the person naming must take into account the knowledge and expectations of the audience. The name must be relevant in the social context of communication. Naming is done in view of achieving a goal.

What frames our competence to name: sensation or theory?

In this section, I want to advance some hypothesis regarding what is being done with the inputs provided by ostensions and characterizations. I will argue that, ostension and caracterization inform different kinds of devices operating at different levels. Ostension is a process that frame our competence to name by multiple associations between words (sounds, writings , …) and objects in the world. On the basis of this multi-modal input, one acquires a sense of identity that will allow him to recognize future instances of the same kind. Characterization, on the other hand, is a process of learning that uses words only. They are abstracts prescriptions, which have a link to the world only through interpretation or application.

The uni-modality of characterization renders it insufficient for the learning of a language: characterization alone does not allow anchoring the words to the real world. At some point, it must rely on ostension. A word is defined with other words; these words can in turn be defined with other words, etc. For this to stop, the meaning of some characterizer must be learned or already known through ostension. A dictionary, for instance, is bound to be circular. Characterizing description is a process similar to definition: it creates some relations of meaning between words and it must rely on ostension in order to provide or enhance the competence to name in any situation. The ability of my son to distinguish ducks from other birds may be enhanced if I tell him that ducks are palmed birds, but only if he is able to distinguish palmed feet! There must be at some point a word-world relation, and this relation is established by ostension. These observations lead to assert the primacy of ostension over characterization. Ostension seems to be the real basic, essential, process to learn how to name. Definition is just a parasitical way to learn, a sort of shortcut that allows not to refer back to reality again and to frame the competence on other more basic ostensively framed competence.

The problem is that neither ostension alone can frame the competence to name. This is because the extension of an infinite class is not determined by a finite number of its members. In particular, the applications of a term are undetermined by its past ostensions. Ostension cannot by itself engender the ability to name. Nor our sense of identity can supplement this indetermination, because this sense of identity is precisely what needs to be determined. Every instance of a kind is similar

and different from any other instance of the same kind, and similar and different from any instance of a different kind. A duck is similar and different from another duck and is similar and different from a goose. Framing the competence to name ducks implies framing a sense of identity that allows asserting that a duck is similar to another duck. Similarity does indeed determine a kind, but similarity itself is underdetermined and problematic. It must always be shown in what respect something is similar to something else. When I have ostentiated a thousand giraffes, what have I been naming? The animals, their neck or their color? Or maybe I meant a strange concept such as 'yellow with black spots until the first of July 2002, black afterwards'. Philosophers have already pointed at that fact (cf Nelson Goodman's word 'grue' (1955) or Saul kripke's strange concept 'quad' (1982)). It has been, for instance, a major argument against the logical empiricists' credo that there are sense data propositions (i.e. propositions which are funded by sense experience only). As a consequence, there must be some theoretical specification that drastically reduces the infinite set of possible naming competence allowed by ostensions. I can see two different ways to appeal to theory for the specification:

(1) The first way is to build up specifications that determine which sense data are relevant. This is manifest in AI's attempt to model ostensive name learning. Deb Roy (2000), for instance, uses hidden Markov models, and implements a program to compute "the probability that the past 20 milliseconds of speech belonged to the 39 English phoneme categories or silence", etc. These specifications are necessary for the computation to take place. The problem when modeling cognition is not only what to do with the input, but also and more importantly, which data must be treated as an input to process. Moreover, these sorts of specifications are grounded. They are implementations of theories about cognition. Statistical models of representations are backed up with theories about prototypes and exemplars. Roy's robot's sliding of the speech in pieces of 20 milliseconds may be grounded on phonology and the neurobiology of the auditory apparatus. True or false, these theories are necessary for the interpretation of the data to be possible. They specify which data, or which range of data, are relevant for categorization. In this sense, any model is theory based. Systems, humans or machine, always have theoretical specifications. What distinguishes AI from other branch of computer science is that the specifications are meant to model human competence. Such modeling provide a perceptually based theory of naming. This trivial appeal to theory, however, is insufficient. Specifications of the kind described above can model innate, biologically specified, competence, but they do not accord a role to characterizations in the processes of naming.

(2) The second way to appeal to theory corresponds to this ambition to take characterization as a genuine input for naming processes. Characterizations, in the form of theory, do play a causal role in naming. Note that the question here is not whether perception is informed by language or beliefs. Given perception, we wonder how theories determine naming. That characterization does indeed determine naming is pretty clear. Take the Muller-Lyer illusion for instance.

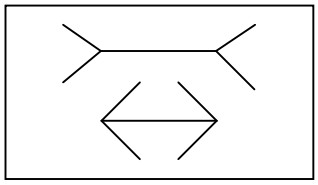

Figure 1: The Müller-Lyer illusion.

You perceive them as having a different length. But if you are a researcher on cognition, you certainly believe (know) that they are of the same length. If you don't believe that yet, I will ask you: "are you sure they are of different length?", and you will appeal to the theory asserting that ‘two length are equal to each other iff they are both equal to a third one’, that is to say that you will compare them with a third length (or you may also fold the paper to superpose them, yet appealing to other theories). At the end of this process, you will certainly name the lines of the Muller-Lyer illusion “two lines of equal length”. The theory ‘two length are equal etc.’ cannot be implemented through ostension only, there must be an irreducible appeal to characterization. What must be characterized here is the equality of length. Of course one can implement an algorithm based on this theory about length (and it is what is usually done), but this just means one has not been implementing the algorithm truly modeling our perception, which originally would prompt us to assert that they are of different lengths. Characterization as well as perceptions determine the act of naming. The first way to model naming is insufficient because it cannot reproduce nor even account for such phenomena. The first way may model and implement some human innate biology and neural network of perception, but it cannot model naming.

There is a second, more general, reason why the first way is unsatisfactory. Naming is already theorizing. It is asserting what is the nature of the object perceived. As 20th century epistemology taught us, theorizing is done taking into account two different kind of constraints: the one provided by experience (as provided by biologically specified organs) and the one provided by our previous theories and overall background knowledge. The non-recognition of the role of theories (understood in the second way, i.e. as explicit knowledge) and other background knowledge for all naming action (be it for ducks or for electrons) implies the creation of a sense data language. If naming is not the combined produce of theories and sensation, then it is the produce of sensation only. Popper, Quine and others have shown, however, that there is no such sense

data language. In other words, hidden Markov models, or any other statistical model that allows linking words with sensations, cannot solve the induction problem, because there is no solution to it. Naming, as an is possible only through the participation to collective conventions and beliefs. This participation is the requisite for being understood or credible, so that other people make sense of our acts of naming. (c.f. Foulcaut's episteme). Theories are what allow us to build a 'structure of language' or a network of words. From characterizations such as 'a duck is not a goose', 'ducks are palmed feet birds' we build relations between the words 'duck' and 'goose' and 'duck' and 'palmed'. And from these relations we determine the characteristic traits that will distinguish a category from another. The category of ducks is, with the above characterizations, distinguished from the categories of goose and un-palmed feet birds.

In the above paragraphs I have tempted to clarify the role that computational modeling of naming should give to theory. I have first argued that naming cannot be caused by some kind of writing on a *tabula rasa*. The input provided by our sense must be organized. I distinguished two ways to solve the problem. The first one is based on similarity theory of categorization or other perceptually based processes. Devices implemented this way may be able to label objects in the world, but it cannot, I argued, model naming. I propose to call the systems that build pattern-matching devices from ostension inputs and pre-defined frozen specifications, **labeling systems**. Likewise, I shall call the computations done by the labeling devices and that have recognition for output, the **labeling processes**. I believe that most of the work done in computational semantics has been towards the specification of the labeling processes. Also, I believe this work has been fruitful. Yet, labeling systems should be distinguished from **naming systems**, which can take various theories into account in their processes for naming. When naming, we, humans, can appeal to different theories that motivate the words we use. Conversely, when interpreting the words uttered by others, we still appeal to different kinds of theories. The theories we take into account forms the background knowledge, or the context. The role and the importance of the context in the utterance and understanding of words arose in the last decade as a major challenge for computational linguistics. But it has been the topic of pragmatics for already half a century. In the next section, I will briefly point out how some of its findings could be used in language processing. A further point of the above section is that characterization provides one of the most important input that is compiled to form the context/background knowledge.

Linguistic devices and social processes

Characterizations are key inputs for the formation of a corpus of data that is used for naming. Characterizations may be organized so as to produce a coherent language network, which is essential to naming. The question that arises now is 'are characterizations plus ostensions sufficient inputs for genuine naming systems?' When we consider humans' naming, the answer, unfortunately, is obviously no. Other kind of non-linguistic theories may intervene in naming. They may concern the current state of the affair, the time and the place where the person believes to be, what is to be said in such and such social situations, the level of language one should use, the beliefs and expectations of the others, etc. Thus naming may call on any belief. Naming is itself the expression of some beliefs. It appears that naming, contrarily to labeling, is not computable after all. It is one of these isotropic and quinean phenomena that motivated Fodor (1983) to state his law of the non-existence of Cognitive Science. Even if the problem promise to be hard to solve, I will maintain the methodological principle that there is no magic in naming, i.e. nothing that cannot be understood.

First, let us consider again what distinguishes the labeling processes from the naming processes. I submit that the holistic appearance of the naming processes and its apparent dependence on unmanageably large databases is only a by-product of the fact that naming depends on two levels of processes. Naming processes involve processes that superimpose on, and manage, the labeling processes. Consider the Muller-Lyer illusion again. A person naming the lines by "two lines of equal length with convex and concave angles etc." has dismissed his immediate sense of identity and difference regarding length as irrelevant in this case. His search of criteria for categorization led him to the theory 'two length are equals iff they are equal to a third one' that he has learned through characterization. The labeling processes -or pattern matching devices- that are then called upon may concern superposition of segments and identity through movement, which are used when measuring. This shift of identity criteria from immediate feeling to measurement may be caused by a simple "check!" from the teacher of cognitive science after a pool of the length impression caused by the Muller-Lyer illusion on his students. Likewise with ducks and palmed feet: A duck-naming device may call on different duck-labeling devices. There is no single relevant pattern for ducks, but one may call on the palmed feet pattern, the bird pattern, or a simple (naïve, primary?) pattern of duck. This may depend on whether I see the duck from below (they fly above me) or from above (they swim in the lake); and this may also depend on whether I am doing an ornithological study or not. The difference, therefore, between labeling devices and naming devices is that the formers have frozen identity criteria while the latter can always change them. The theory I propose is that naming devices change their identity criteria simply by calling up a different labeling device. We are born with innate abilities to categorize, but the output of these abilities is interpreted for naming. The interpretation of

perception is done through the choice of the relevant traits, which is processed by choosing the relevant labeling device to apply. Naming processes include *directed* similarity checking. The fact that naming is the product of higher processes using the labeling devices is further shown by the fact that naming can always free itself from previous identity criteria. It is, in fact, what renders the development of science possible: new theories amount to categorizing the world in a new way, using new, more appropriate, criteria. When such a change occur, what happen in the linguistic community of scientists is that they adjust the naming devices for the new terms so that they rely on different labeling devices.

This said, we must, of course, go further. We have just delayed by one step the problem, and it has now taken another form: we must discover what are the processes that produce criteria for categorizing. At this point, I want to go back to the observations of the first section: naming is taught, naming is used for communication, i.e. for social interactions. Together, these observations provide the causes of the choice of the criteria for categorizing.

First, a criterion is relevant because we've been told so! Teaching to name is teaching which are the criteria to use for naming. For instance, we've been taught that lengths of segments must be compared with the use of a standard segment, and we've been taught which traits characterize the duck. Note that we find characterizations again. It is at this higher non-perceptual level that they intervene and frame the competence to name. They are inputs for the higher devices that produce the criteria used for naming.

Second, a criterion is relevant because it serves the purpose of communication, viz. the management of social interactions. Such is for instance what causes the difference of criteria being used for the wine connoisseurs and the child. The will to act upon the others' thought or behavior is also at the origin of the will to be credible, which in turn makes naming devices choose criteria that are acknowledged to be the right criteria (i.e. those that produce appropriate names) by others. Theories that concern the others' beliefs are essential inputs for naming devices. The fact that such representations are involved in communication (and a fortiori in naming) is, since Grice, a well-established fact in pragmatics.

Naming is therefore goal oriented. Its goal is the management of social interactions. The choices of the criteria for naming are done in view of achieving this goal. The higher processes of naming solve social oriented tasks in order to determine the labeling device to apply. Naming is labeling with adapted specification. The specification is adapted to the situation. Thus our sense of similarity is indexed by our understanding of thesocio-physical environment. There is a feedback loop between theories or sets of criteria allowing to interpret perceptions and perceptions calling up, prompting, theories for future interpretations. The motor of this loop, however, is social interaction. Through social processes such as normativity, teaching, the fulfilment of the others' expectations, etc. the labeling devices are picked up. With naming, cognitive and social processes are closely interelated. The analysis of the latter as well as the formers should therefore help us in our modeling entreprise. Naming is based on social constraints, it is a socially based categorizing act.

The hypothesis following which there exist two levels of computations and thus a computational device or module included in another has been put forward by J-L. Dessalles (2000). His arguments relies on theories concerning the evolution of language. Following Bickerton (1990), he argues that there exists a proto-language at the basis of our naming capacities. He then describes the proto-language very much in the same way as would expected to resemble the output of labelling devices, i.e. bare labelling of categories framed by perceptual indentity feelings. Dessalles goes on to argue our current capacity to name lays on a further capacity whose original function is to argue, where arguing is described as a cheeter (lyer) detecting procedure. Dunbar (1996) also argued that the biological origin of language is to be found in the management of social interaction. These theories corroborate with their own arguments the hypothesis I have put forward, also, they provide ideas for the specification of the higher device involved in naming. Of course, most ideas and insight regarding this device is to be found in pragmatics. Naming is involved in the management of social interaction essentially because it serves communication. Communication has been discribed by Grice (1989) and Searle as reliying on social conventions, which, in our framework would be formalised as essential background knowledge for naming and communicating. Sperber and Wilson (1986), on the contrary, described communication as reliying on innate cognitive principles (expectation of relevance). This principles, in our framework, could be the essential specifications of the higher naming device.

There is a disparate scientific litterature that is, or so it seems to me, pointing in one direction: the existence of a specific capacity that is involved in naming and which deals with, and originates from, the management of social interactions. This management involves taking into account the context, including theories about the world gained through one's own experience or through hear say (characterizations), but also hypothesis on what others might think and expect from us. In this paper, I hope that I have set a framework that would allow natural language processing to develop using this litterature.

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