WHAT IS LANGUAGE? PROPOSAL FOR A THEORY ON THE BASIS OF POPULATION THINKING

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Abstract: *In this paper the author proposes a theory of language based on population thinking. Special emphasis is placed on metaphysical consistency, which leads to some rather fundamental considerations. The core of the theory is the idea, that language begins with concrete individual neuronal events, which form a population and develop into concrete individual mental language-relevant ideas. These, in turn, are synchronized with other speakers through communication, resulting in a population of language elements that together make up the whole language. This leads to a mixture of standard and deviant variants, and finally to the possibility of normative regulations. This in turn influences the synchronization behavior and ultimately causes a feedback effect on the individual mental and neuronal events.*

1. Introduction[1]

This article proposes a comprehensive theory of language. Its core idea is, that language has the character of a (meta-)population[2]. With this idea we particularly follow Ernst Mayr (1904–2005), Robert Boyd (*1948) and Peter J. Richerson (*1943)[3]. For the concept of language we use the following general definition: **language =df. a meta-aggregation of cultural technologies for cognition and communication by means of depiction through symbol-based coding**, and restrict ourselves to "language" in the direct verbal sense. This means the natural oral language of humans, i.e. the production of sound by the speech organs and their reception through hearing and understanding, including all biological, cognitive, mental and socio-cultural factors. We will not deal with written language. As the limited space makes it necessary, we concentrate on the essentials, thus will firstly outline the context and secondly go straight into the theory.

2. Context

Assertions that contradict each other cannot simultaneously be true, whereby „being true" is understood in the sense of „correspondence with the fact(s) presented"[4] here. This is called the "principle of noncontradiction", or the „law of noncontradiction", and was already mentioned by Aristotle[5] (384 BCE–322 BCE). It is

[1] This paper was translated from German into English by the author and with the help of DeepL (https://www.deepl.com/translator [2023-11-15]).

[2] See definition of "population" below.

[3] Cf. Mayr, Ernst, Darwin and the Evolutionary Theory in Biology, in: Meggers, Betty J. (ed.), Evolution and anAhropology: A Centennial Appraisal, Washington DC 1959, pp. 1–10; Mayr, Ernst, Typological versus Population Thinking, in: Sober, Elliot (ed.): Conceptual Issues in Evolutionary Biology, The MIT Press/Bradford Books, Cambridge (MA) 1994, pp. 157–160.; Chung, Carl, On the Origin of the Typological/Population Distinction in Ernst Mayr's Changing Views of Species,1942–1959, in: Studies in History and Philosophy of Biology and Biomedical Sciences, 2003 (34), pp. 277–296; Boyd, Robert/Richerson, Peter J., The Origin and Evolution of Cultures, Oxford University Press, Oxford 2005; Richerson, Peter J./Boyd, Robert, Not by genes alone: How culture transformed human evolution, University of Chicago Press, Chicago 2005.

[4] Given that the state of affairs lies outside the assertion and its presuppositions.

[5] Aristotle, Metaphysics, 1011b13-14 (https://en.wikisource.org/wiki/Page:Metaphysics_by_Aristotle_Ross_1908_(deannotated).djvu/97 [2023-11-15]).

the most certain thing we know, because it cannot be refuted without applying it, and if we can use it to gain knowledge, we have a very solid basis. The most obvious strategy of its application would be an indirect one, namely taking a set of assertions and eliminate all assertions that cause the greatest contradiction, in particular because they contradict with most of the most corroborated assertions. We do not claim that this always works, and of course there are also countless details to consider, such as the fact that an indifference assertion must always be added, i.e. the assertion that information is not (yet) sufficient for a definitive assertion. However, if the procedure works, the remaining assertions are the „least bad alternatives". They are therefore not automatically true, but tried and tested, and as this is the most solid thing, humans can get. So, anyone wanting to be rational should agree with them.

We do not perceive nothing – otherwise we would not be able to read this sentence here –, and this "fact of perception" has metaphysical implications, because it means that it is not the case, that nothing exists, what we call the "**principle of non-non-existence**". The totality of everything that exists we call the '**universe**'. From the principle of non-contradiction and the principle of non-non-existence we can derive basic logic. With the help of logic, we come to the conclusion that if something exists, everything that is necessary for its existence and everything for which its existence is sufficient also exists. So existence has some necessity, and therefore is not completely random, but must be determined at least in some way. Since on the other hand the existence of arbitrariness cannot be completely ruled out either, we assume that determinism and indeterminism coexist in principle. From determinism follows that the universe cannot be completely formless because this would be completely arbitrary. So **form** must exist as well and we will say that the universe is not amorphous.

Additionally, if the universe is at least partly determined, this means that at least one overall state of the universe influences the existence of another possible overall state, which means that the overall states of the universe influence each other at least in one direction. Furthermore, the non-amorphism of the universe just mentioned means, that there must be local differences within the form of the entire universe. This does not yet justify the assumption of the existence of individual entities, because there still is the problem of demarcation,[6]. However, in order to simplify further investigation, and thus actually arbitrarily, we will at least refer to all philosophically meaningfully definable parts of the universe as '**entities**'.[7]

The overall structure of the universe follows a simple logic: it all began with physics, i.e. a kind of **physical revolution**, which gave rise to spacetime and matter. Today we know that spacetime and matter interact with each other, but even in the beginning of the physical world there must have been some **metaphysics**, i.e. at least some mathematics and logics. Most entities we know exist singularly in space-time, but not necessarily without regularities, which is why we will (also arbitrarily) assume the existence of singular „**patterns**" in the sense of singular local areas with higher and thus noticeable regularity. Regarding the existence of ideal entities, we will take an agnostic position and thus not use axioms on a Platonic basis. However, the fact of non-amorphism of the universe motivates us to assume that not all entities in the universe influence all others in exactly the same way. This motivates us to make the (also arbitrary) assumption that not only overall states of the universe, but also individual entities can influence each other ceteris paribus. If the influence is an existential one, we call this an '**existential conjunction**', and if one entity produces another, or if at least one aspect of the entity produces at least one aspect of the other, we call this '**causality**'. After the physical revolution came the **biological revolution,** i.e. the beginning of life, whereas life actually is a sequence of mutual reproduction of exceptionally information-rich and stable heritage molecules (genes) and autonomous, systemic entities with metabolism (living beings). The next revolution was the beginning of **mental** life, so

[6] This addresses the question of how strict the boundaries between an "entity" and everything else must be in order to be sure that there is an entity at all (electromagnetic waves are a vivid example of this problem) and how strict the differences between two "entities" must be in order to be sure that there really are two entities and not just one.

[7] Note that this is not a metaphysical assertion.

„inner experience“, i.e. attentive and later conscious life, up to the individual's awareness of its own existence (i.e. self-consciousness). The next and penultimate revolution was the beginning of **culture**, which is a meta-aggregation[8] of entities that is dominated by biologically indeterminate behavior, controlled by synchronization with peers. Culture can override basically everything that existed before. Finally, it is not impossible that there will be another revolution in the future, namely that of **artificial intelligence**.

3. Theory of language

3.1. Depiction

As we take an agnostic position towards the existence of Platonic ideas, we try to avoid such concepts as much as possible, and therefore assume that language does not exist in a world of Platonic ideas, but in concrete information stores, whereby we „information“ will be understood in a non-platonic sense.[9] The primary information stores are animal and human brains, as well as artifacts. Starting point of the theory is language's ability to depict entities outside itself, which is why the concept of depiction must first be established. To do this, we start with the concept of identity, and here we find, that two entities A and B are absolutely identical, if and only if there is no third entity C, so that the form of one entity A is a composition of the form of entity B and the form of entity C. Entity C we call the 'difference', thus absolute identity (trivially) means that there is no difference. This can probably only exist – if at all – in the form of self-identity. If there is a difference between A and B, but it is as minimal as possible, i.e. less than the differences between each of the two entities A and B and any other entity X in the universe, we call it '**equivalence**'. Equivalence therefore means relative non-ontic quasi-identity.

If two entities A and B are given, and A and B have two (distinct) sets of properties S_{PA} and S_{PB}, it is easy to see, that there should be some internal relations in both sets. Let's take only two of them for example and call them R_A and R_B. Now, if R_A and R_B are equivalent and if this equivalence is caused by one of the two entities A or B, we call this '**depiction**'. The two entities A and B then correspond to each other with respect to these relations R_A and R_B, i.e. there is **correspondence.** If we want to understand information in a non-platonic sense, every depiction, such as a photograph etc., must have a material basis. But this does not necessarily have to be baryonic matter, because as far as can be seen, it can be any kind of matter, like waves for example. This means that entities can be depicted onto waves as well, an this is widely used in technology, like radio- or computer-technology. So, an image on a paper print is baryonic matter, but the equivalent image projected by a computer projection is wave-based.

Let us now think of a simple input-output system in an environment that, ceteris paribus, does nothing other than produce a certain (also sufficiently defined) output O_D in response to a certain (sufficiently defined) input I_D. Trivially, there is one desired combination ('I_D/O_D') and three undesired ones: '$\neg I_D/O_D$', '$I_D/\neg O_D$' and '$\neg I_D/\neg O_D$'.[10] When nature, culture or technology „use“ such systems, however, the situation is different. Here it is about a state of affairs SV_I, which is to be linked to O_D by means of I_D, like a light barrier in an elevator, for example, should prevent the door from closing ($=O_D$) if an obstacle ($=SV_I$) is in the way, and the mediating information I_D in between is only a means to this end.

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8 For the definition of this concept see below.

9 The concept of information plays a prominent role in many sciences. We usually think of information as an immaterial (and thus not spatiotemporally bound) platonic entity, but at the same time we speak of information transfer, which means a change in spatio-temporal position and makes the whole concept contradictory. On the other hand, it is difficult to do without it, because we need it to describe the fact that one entity transfers its form to another, especially if there are almost no material changes in the process. To avoid this problem, we will use "information" as a fiction and as a metaphor for the aforementioned fact that an entity, so to speak, causes the fact that another entity now has a form that is equivalent with a form of the first entity.

10 This means that the system works with 2 bits.

Now, the key question is, what happens when complexity increases: Initially, only further inputs would be added to input I_D and together form an overall input to which the output is now linked. In a second step, a certain pattern would be defined in the overall input, and in a third step, certain properties/relations of/in the pattern of the overall input would act as a criterion (such as „$I_D \leq \pi$“), which must be fulfilled in order to produce the output. At this point at the latest, the system must be able to verify whether the criterion has been met or not, and thus be an **information-processing system**.[11] Information processing is any production, use, modification and scheduling of information, and in order to be able to do this, every such system (be it a machine, a living creature etc.) must have sufficient autonomy. For this it must at least contain an input receptor, a central processing unit, memory and an output producer. In order to examine the input I_D, the machine must be able to integrate it into its own computing circuits. For more complex machines, the most important strategy for this is the **reconstruction of I_D** by another piece of information I_M. Now we are dealing with three pieces of information: the input information I_D, the machine information I_M and the output information O_D. In reality, however, there are actually four, because as stated above the output should ultimately be linked to a specific constellation in the state of affairs SV_I. With regard to depiction, the main question is to what extent the machine information I_M is a representation of the factual information I_{SV}.

3.2. Population

Many entities within the universe are **combinations** of somewhat smaller entities. This is trivial and can safely be said even without tackling the old question of the smallest elements of existence. Depending on how organized a combination is, a distinction can be made between simple combinations and **systems** and also between **compounds** (“Verbindungen”) and **aggregations** (“Verbaende”), whereby the former have a higher degree of organization than the latter, and they consist of parts whereas the latter consist of equivalent elements. Both, compounds and aggregations, are entities and can in turn be combined into meta-forms. An apple, a car or a rhinoceros, for example, are compounds, while a flock of birds, a colony of ants or a swarm of bees are aggregations. If, for example, a swarm of bees separates into two swarms, this separation has a natural transitional phase, and there is no metaphysically nor physically marked point at which this separation takes place exactly, just as there is no such point for the demarcation between day and night or between liquid water and steam. The transition between Old High German and Middle High German could also be seen as a phase, although in this case it is even more accurate to see the entire development of the German language as phased, i.e. in this case continuous. The same applies to so-called dialect continua, but not in terms of time but in terms of space. In the case of fairy tales and legends, on the other hand, there are diachronic and synchronic variants with fluid transitions, so that sometimes it is impossible to say which variant exactly is the fairy tale. In reality there is only a group of variants, and at most one can more or less arbitrarily determine that one of them is the standard version.

However, this raises the question of the metaphysical existence of such entities. For the context of biology, Ernst Mayr has introduced the concept of **population** for this purpose and subsequently Robert Boyd and Peter J. Richerson (among others) have done the same for the context of culture.[12] We explicitly follow them, but not without mentioning that the concept of population has an even broader reach. The concept of population will be understood here as a (meta-)aggregation of autonomous but coordinating elements. Trivially, herds of cattle or flocks of birds are not only aggregations, but also populations. However, the question can be asked whether animal and human behavior also has a population character. However, this is not so easy to see. If we start with animal life, we see that depictions[13] are „used“ by nature in a variety of ways and for very different

[11] Note what we have just said above about the concept of information.
[12] See FN 1.
[13] See above.

purposes, in particular for orientation in the environment, for planning and for communication.[14] Depending on the level of complexity, this requires a sufficient degree of neuronal and/or mental competence. Even among unicellular animals there are motile species, i.e. they are capable of autonomous movement. Among multicellular animals, more or less all of them are motile in one way or another, which means that **behavior** in the sense of non-somatic biophysical activity must be very old. Therefore, the next question is how this behavior is controlled. Sponges, for example, do not yet have neurons, while cnidarians only have a nerve network but neurons[15], which are probably the oldest **neuronal entities** in the world. Even in such rather simple organisms, the mechanism is based on the principle that many specific individual neuronal events – each existing singularly in space and time – form population of such individual events, and such produce patterns of event. This means that although the control system for generating hunger, for example, originates from different neuronal events, the pattern „hunger" is always the same, which means that a **populations of specific individual neuronal events** with their specific form produce a neuronal event pattern.

Planarians – a special type of flatworm and thus a very simple and ancient form of Bilateria, i.e. bilaterally symmetrical animals – already have a so-called subepithelial nervous system, neurons and also a brain[16]. These and all more higher animals therefore already have the capacity for cerebral and thus central neuronal behavioral control. They also produce populations of concrete individual neuronal events at the lowest level, which together produce a neuronal event standard variant. We call these patterns '**meta-neuronal events**', and it can be assumed that they are also **pre-mental cognitive events.** The big question, however, is to what extent animals also experience them. It can be assumed that meta-neuronal events are also **proto-mental experiences**, at least in a rudimentary form, i.e. that they are also **internally experienced** at least in a minimal degree – not consciously perhaps and certainly not reflected upon, but probably attentively, although the mechanisms that led to this huge evolutionary leap are unknown. So, to repeat this very clearly, (cognitive) information processing in animals initially began purely neuronally, then it became more complex and autonomous and at some point was also experienced mentally.

However, it does not matter for our theory when exactly this has started, but the **mental entities** were in the world, even if it initially had to manage without consciousness. **Mental experiences are thus basically generated by populations of neuronal events**, although the exact mechanisms of how this happens are still unclear. In humans, the following entities belong to the world of the mental: (1) ego-experience, i.e. ego-consciousness and attention including the permanent stream of thoughts; (2) volition, i.e. wanting and deciding; (3) emotion, i.e. feeling; (4) memory including automation and (5) cognition in the broad sense, i.e. the production of orientation, including perception, cognition in the narrow sense (thinking) and language processing. This does not include somatic perception (e.g. pain sensations) and somatic control.

3.3. Synchronization

The more competent the brain became in the course of evolution, the more degrees of freedom it had and the more important became the question of ensuring a sufficiently high level of quality in its "products". In this context, this specifically means the functionality of mental experiences, such as the mental experience of "fear", which the brain should produce in the event of danger and only in the event of danger, or the mental experience of sexual attraction, which it should produce when in contact with suitable sexual partners and only

[14] For a good overview of the evolution of neuronal, cognitive and mental life see Bennett, Max, A Brief History of Intelligence: Why the Evolution of the Brain Holds the Key to the Future of AI, William Collins, London 2023.

[15] chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://link.springer.com/content/pdf/10.1007/978-3-319-55065-7_589.pdf?pdf=core, 4595.

[16] Narayan, Ravi Kant/Verma, Manika, Encephalization, in: Vonk, Jennifer/Shackelford, Todd K. (eds): Encyclopedia of Animal Cognition and Behavior, Springer, Cham 2022 (https://doi.org/10.1007/978-3-319-55065-7_1786 [2023-11-15]).

with such partners, etc. The brain had and has to produce all of this, and there were and are roughly speaking two mechanisms for quality assurance:

– **biological evolution**, which at least on the long run eliminates dysfunctional brains
– **culture**, that is, a meta-aggregation of entities dominated by biologically indeterminate behavior and controlled by coordination with peers

At this point, however, it should be emphasized once again that there are (simple) forms of language not only in humans, but also in animals, and presumably with both bio-evolutionary and cultural control. However, we will limit ourselves here to **human language**, which is also controlled or shaped by both biological evolution and culture. According to the well-established view that we are adopting here, however, it can be assumed that the cultural component clearly predominates. Everything that has been said about human language can in principle also apply to other cultural entities, but this cannot be discussed further here. The theory proposed here follows the view that all of these (meta-)entities are populations. The people concerned need not necessarily be aware of this, because for them – and probably also for many scientists – cultural entities look essentialist, i.e. like monolithic Platonic entities. Unlike biological evolution based on genes, it is very difficult to find primitives or atomic elements.[17] But it is not at all proven, that the mechanisms, we are talking about here, really need such atomic elements. But this has to be discussed in further papers.

Thus Language, including all aspects related to it, is thus understood as a population of language related entities, and the mechanism works as follows:

1. At a specific points in time the brain of a specific person produces *concrete neuronal events*.
2. Together these concrete neural events form a population, and thus a *concrete neural language related pattern*.
3. Together these concrete neural language related patterns form another population, and thus a *concrete, mental language-relevant pattern*, i.e. a *language-relevant idea*.
4. Together these language-relevant ideas of different people form a population – now stored in more than only one brain –, and thus an *element of the language in question*.
5. Together these elements of the language form the final populations, i.e. the *language in question*.

Although **every language is ultimately a complex and multi-layered (meta-)population of concrete neuronal events**, this does not yet clarify how the forms of this language, or of language in general, arise. There is not enough space here to discuss this in detail, but at least the basic, population-forming mechanisms will be discussed. Everything that goes beyond it must be shown in further work. To this end, we propose that – like all dominant cultural entities – language is shaped by what we will call '**synchronization**', which is one of the most important ideas of this theory. Note that this is no biological reductionism but rather some kind of cultural realism on a biological basis. The term „synchronization" refers to a permanent stream of (mostly unconscious) coordinating events between peers on all stages, i.e. from the micro to the macro level. Synchronization[18] requires cognition and communication. The concept of cognition is has already been discussed above. In turn, „communication" is understood here as the autonomous, purpose-oriented, i.e. (proto-)intentional, sending and receiving of information, including all associated cognitive information processing. Early on in evolution, living beings developed the ability to perceive chemical, optical etc. properties of their conspecifics. This represented a kind of „involuntary" transmission of information. However, since (proto-)intentionality is missing, we call this first stage here '**pre-communication**'. The animal brain then began to separate certain behaviors from their original purpose and to use it autonomously and proto-intentionally for the purpose of information transfer. This did not yet require mental experience, but only purely neuronal cognitive or proto-mental information process-

[17] Therefore Richard Dawkins (Cf. Dawkins, Richard, The selfish gene, Oxford Univ. Press, Oxford 1976) for example introduced the concept of the meme. Nevertheless, we do not need this here.

[18] This is based on learning, but we will not discuss this aspect here.

ing. From now on, however, we can speak of **communication.** Bees even use coding, which is not the rule but the exception. In addition, animals developed organs that were good for nothing other than communication the vocal organs in particular. This points to the development of communication on a large scale. This type of communication, differing from the next stage only by the lack of coding, still exists in many variants in the animal kingdom. One example is the (largely uncoded) singing of birds.

Finally, early forms of semiotic cognitive information processing and communication developed, which we will call '**proto-semiotic cognition and communication**'. Animals used simple forms of standardization and thus standard variants, i.e. rudimentary standard signs[19], but remained **iconic**. In other words, rearing up and showing what could be done to the opponent was understood as a threat, but iconically and not symbolically. The latter could be the case when one opponent described this to the other in calm voice – which, as far as the author knows, is no regular habit of animals. However, symbolic communication does exist in animals not only in the case of bees, but also with sounds, in that a certain tone sequence means "danger from above" or "danger from below". Human language, on the other hand, is dominantly coded in symbols and is therefore dominantly based on coded cognition and communication. Coding means any depiction on a system of a few symbolic elements, of which the well-known Morse alphabet is an illustrative example. We will not go into detail here.

Of course, synchronization is not necessarily symmetrical or constant. On the contrary, there should be clear directions and trends in synchronization, for example in that new speakers tend to orientate themselves towards experienced speakers, less successful speakers towards successful ones, and so on. Of course, writing played a role as well, but we won't go into that here. **Synchronization errors** could be just as much innovations as individual new variants. They could prove themselves either evolutionarily by increasing the speakers' chances of survival or culturally simply by being used rather than forgotten. As this is all quite complex and prone to errors, the pressure for functionality, especially for understanding each other, leads to standardization, synchronizations did not lead to random variants, but certain variants dominate the community of speakers, which leads to socio-communicative language synthesis. In the further course, standardization through synchronization leads to a mixture of standard variants and deviant variants. The standard variants are not automatically normative because no one could have defined them normatively. However, they can finally be fixed by authorities **normative regulation**. This in turn stabilizes itself because it changes the synchronization behavior. One should then choose certain variants and avoid others. The result is a specially formed population of language variants guided by rules.

4. Summary

The view proposed here applies population thinking to the field of language. Following those who have developed this view, the author tried to propose a theory that is as metaphysically consistent as possible. This necessarily led to some rather fundamental considerations. In essence, the theory states that language is created in such a way that populations of concrete individual neuronal events lead to language-related ideas. These also form populations and are then synchronized via communication with other speakers, which leads to a mixture of standard variants and deviant variants. Finally, normative regulation occurs. So, if put in terms of linguistics, Ferdinand de Saussure's conception of language as langue, which is performed as parole, is thus reversed, because by incremental steps parole produces langue. This applies to all linguistic dimensions, i.e. to Saussure's (1857–1913) *signifié* and *signifiant*, as well as to Charles Morris' (1901–1979) *syntax*, *semantics* and *pragmatics*, which could not be discussed in detail here. Further research must focus on the question of the details and justification of the individual parts of this theory, but in particular also on the problem that the perspective of speakers is usually far away from this view, because they usually do not take into account the population character of language.

[19] It should be noted that in principle communication can also take place without signs, such as communication through smells.