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## EXPLANATORY ACCOUNT OF THE HUMAN LANGUAGE FACULTY: THE DEVELOPMENTALIST CHALLENGE AND BIOLINGUISTICS<sup>1</sup>

### ABSTRACT

The aim of this paper is to explore whether Maria Kronfeldner's analysis of human nature could be applied to the concept of cognitive systems and related capabilities, such as the human language faculty. Firstly, I will address the nature-nurture debate, that is, explanatory claims of nature as having a role in causing the language ability, and explanatory claims of culture as responsible for the development of human language capabilities. The nature-nurture divide generates a problem since it overlooks the interaction of nature and culture during the development of language capabilities, the problem called the developmentalist challenge. I will demonstrate different standpoints that try to answer this challenge, most famously the constructivist theory of Jean Piaget and the theory of universal grammar of Noam Chomsky. Following the insights of Kronfeldner, if we opt for an explanatory (and not classificatory or descriptive) account of the human language, we will search for the explanatory epistemic roles and their fulfilments. As Kronfeldner states, different sciences search for different differences regarding explanandum, and I hope to show that the integrative interdisciplinary framework dealing with cognitive systems is needed. The conclusion is that biolinguistics is an interdisciplinary field with a necessary unifying potential regarding explanatory account of the human language faculty.

### KEYWORDS

language faculty, the nature-nurture divide, the developmentalist challenge, Piaget-Chomsky debate, biolinguistics.

## Introduction

Maria Kronfeldner's book *What's Left of Human Nature? A Post-Essentialist, Pluralist and Interactive Account of a Contested Concept* challenges and revises the concept of human nature by dealing with it in three independent

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questions: the classificatory question of human nature, the question of a descriptive account of human nature and the explanatory question of human nature. All these questions are considered after removing the essentialist way in which traditional human nature is imagined: as a way for concepts that classify, describe, and explain “human nature” to play more than one epistemic role for different accounts. The aim of this paper is to explore whether an analysis like Kronfeldner’s could clear up some of the debates regarding the concept of cognitive systems and related cognitive abilities. Specifically, I will analyse the accounts of the human language faculty, that is, the cognitive system that supports the acquisition and use of certain languages – with several core properties (Pietroski and Crain 2012). For Kronfeldner, the classificatory account of human nature should deal with the question of “who are we and who counts” (Kronfeldner 2018: 210). This question is notably debated by John Locke, who introduced the term “sortal” to account for what the essence of a thing is (Grandy and Freund 2023).<sup>2</sup> This question is also an important question about personal identity, in a way that poses the problem of which criterion defines what people/persons are.<sup>3</sup> The descriptive question of human nature asks “how are we?” or “what is it like to be a human?” (Kronfeldner 2018: 92). In the philosophy of mind, Thomas Nagel (1974) was the one to pose the “what is it like to be a bat?” question to address the problem of the subjective character of phenomenal consciousness, later formulated as the hard problem of consciousness (Chalmers 2010), which was preceded by the problem of the explanatory gap (Levine 1983) between the functional properties of a conscious experience and its subjective, phenomenal character. The explanatory account considers the question of *why are we the way we are?* This question, I hold, has a good potential to define and clarify what was established as the subject of cognitive science and the philosophy of cognition, namely, the acquisition, formation and development of human cognitive capabilities. Among human cognitive capacities, the ability to have a language is one of the most prominent ones; human’s capability to speak is, for many philosophers following the (in)famous essentialist presuppositions, which Kronfeldner tries to refute, one of the hallmarks of human nature: being human means having a language.

In this paper, I will deploy Kronfeldner’s strategy of using divided and differentiated concepts of human nature accounting for different epistemic roles of classifying, describing and explaining, to apply and analyse the explanatory epistemic role as the ability of formation, development, and evolution of human language. In accounting for the human language faculty with an explanatory (and not classificatory or descriptive) epistemic role, I will claim, we can see the unificatory framework of different explanatory accounts for this capability.

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2 I thank the anonymous reviewer for this remark.

3 For example, two dominant and opposed criteria are: 1. The Physical Criterion, that states that  $x = y$  if and only if  $x$ ’s body =  $y$ ’s body; and 2. The Psychological Criterion, stating that  $x = y$  if and only if there are times  $t$  and  $t'$  such that  $y$  is at  $t'$  psychologically connected with  $x$  at  $t$  (Thomson 2008).

Human language capability is susceptible to the developmentalist challenge, which Kronfeldner introduces to explain the needed interactionist consensus when we speak about characteristics developed “due to nature” and, in our case, characteristics of language faculty developed “due to culture”. Language acquisition and its use is one of the characteristics to which the interactionist consensus is grandly applicable, and where the nature-nurture interaction shows its biggest enmeshment. Cognitive science developed several mechanisms regarding human linguistic abilities, but they are still incommensurable, as are explanations in cognitive science in general. This incommensurability can be seen as stemming from the enmeshment of the classificatory, descriptive and explanatory accounts, and that is why I think Kronfeldner’s strategy of divided natures can be shown fruitful applied to concepts of cognitive abilities. The problems with incommensurability can also be seen as stemming from Leibniz’s mill argument, which is formulated as the Leibniz’ Gap: that “there is a gap between the concepts of BDI (Belief-Desire-Intention) psychology and those we use to describe the brain” (Cummins 2000: 133).<sup>4</sup> So, there is a problem with integrating explanations from different sciences, especially of the “higher”, psychological layers of explanation to the “lower”, biological layers. A central part of the reply to the question of the unification of explanations deals with abstraction (which Kronfeldner also considers), or the question of where abstraction should stop. Peircean principle of abduction, I will claim, can be shown as valuable in dealing with the abstraction problem. The abductive principle, as Chomsky formulated it, “puts a limit upon admissible hypotheses” so that the mind can “imagine correct theories of some kind” and discard infinitely many others consistent with evidence (Chomsky 2007). I will start by illustrating the problem of the nature-nurture divide in regard to human language capability, mentioning the gene-centric stance of Steven Pinker and Barbara Herrnstein Smith’s and Lewontin, Rose and Kamin’s critiques of biological determinism. Then, I will compare Jean Piaget’s theory of development of language capability and Vigotsky’s critique of “fixed development”. As Anette Karmiloff-Smith states, the development of the brain and cognitive abilities cannot be seen as uniform, because of neuroplasticity. Lewontin, Rose and Kamin regarded development as a dialectical process of inputs from both nature and nurture and their enmeshment. Kronfeldner uses

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4 Some authors, for example Fodor, argued for the autonomy of psychological explanations (Fodor 1997). Other ones, such as Piccinini and Craver, think we need to find a way to integrate psychology and neuroscience (Piccinini and Craver 2011). Two problems related to the Leibniz’ Gap in contemporary cognitive science are the problem of realization – that every functionalist account needs to consider a physical system that realizes respective functional roles; and the problem of unification – that different explanations in contemporary cognitive science and psychology all have very different frameworks and “explanations constructed in one framework are seldom translatable into explanations in another” (Cummins 2000: 140). Throughout this paper, I hope to address both problems regarding the cognition of human language faculty, especially the insistence on a unified framework of explanatory accounts.

the term developmentalist challenge, after which the interactionist consensus, i.e., the claim that nature and nurture interact at evolutionary, developmental, and epigenetic levels is established. In part 3, I will analyse the famous debate between Jean Piaget and Noam Chomsky regarding the development of human language faculty. In that debate, the problems of confusing the levels of description and the level of explanation can be seen, as well as the problems of remaining essentialist presuppositions. In explanatory accounts, different sciences search for different differences regarding explanandum, and I will try to demonstrate, they ultimately aim at the explanatory unification of the cognition of human language. In part 4, I will show that biolinguistics is one of the fields with a unifying potential to explain language traits that reliably reoccur because of developmental resources that travel the channel of biological inheritance, over time as well as in space, which is coextensive with Kronfeldner's account of the stability property of human traits and capabilities. In that way, I will try to deal with the explanatory account of something previously called (a part of the) human nature: explaining why human beings speak the way they do.

## 1. Nature-Culture Debate and Language Acquisition

In the chapter “Sewing Up the Mind: The Claims of Evolutionary Psychology” from *Alas, Poor Darwin*, Barbara Herrnstein Smith criticizes the nativist claims of Steven Pinker, specifically his nativist gene-centricity. Starting from the very use of the concept of *mind*, this reductive methodology is questionable, according to Herrnstein Smith, because it reduces the various characteristics of human cognition (e.g., observable patterns of behaviour and introspective experiences to various capabilities, processes, and innate mechanisms) to one concept, that we accept in different times and different informal and formal discourses (Herrnstein Smith 2001: 162). Pinker uses “due the nature” explanation as a causal explanation, that stems from Galton's divide between nature as referring to the hereditary developmental resources handed down from parents to children via biological reproduction and nurture as an inclusive term for culture, environment, and everything else not transmitted via biological reproduction (Kronfeldner 2018: 61). One of the most confusion-leading consequences that this division yields regarding cognition is a simultaneous misuse of the term “mind” and the term “brain”, that leads to more confusion and explanatory gaps in the philosophy of mind and cognition – such as statements that the hardware of the mind is the subject of neuroscience and the software is for evolutionary psychology (Herrnstein Smith 2001: 163–164). This division can be seen as inherited from the Cartesian view of body-mind dualism and leads to the well-known problem of interaction: we do not know how to explain how the “physical” factors relate to “mental” ones and vice versa, and this problem also constitutes the mentioned contemporary problems in cognitive sciences stemming from Leibniz' Gap. There are also problems visible in related parallel dualisms such as “the contrast between biological and cultural

determinisms that is a manifestation of the nature-nurture controversy that has plagued biology, psychology, and sociology since the early part of the nineteenth century”<sup>5</sup> (Lewontin et al. 1984: 267).

Lewontin, Rose and Kamin describe the view that human characteristics are “due to nature” as a biological determinism stance: “a reductionist explanation of human life in which the arrows of causality run from genes to humans and from humans to humanity” (Lewontin et al. 1984: 18). One of the most illustrative examples is shown in the book *Oliver Twist*, where we can follow the orphanage-raised and living on a street Oliver, who has impeccable grammar and the way of speaking, as opposed to Jack Dawkins, whose “English was not of the nicest” (Lewontin et al. 1984: 17). The explanation that Oliver’s language-using abilities are due to the fact that he is actually a son of an upper middle-class family shows constant affirmation of “nature above nurture”. However, maybe the example of language was not the best example of Charles Dickens, because, as Lev Vygotsky showed, debating the ideas of Jean Piaget, “a child is not a miniature adult, and his mind is not the mind of an adult on a small scale” (Vygotsky 1986: 13). The idea of *development* is a crucial idea of human thinking and speaking, according to Piaget. But, according to Vygotsky, Piaget also had problems with the nature-nurture divide, and “the prevailing duality (materialism versus idealism) that is reflected in the incongruity between theoretical systems” (Vygotsky 1986: 13) because his theory contains a gap between biological and social. The biological is seen as initial, primal, contained in the child itself, the thing which makes its physical essence; the social, on the other hand, is something that acts forcedly, as an external and foreign force in relation to the child. The fundamental problem of the nature-nurture divide as well as Piaget’s developmental theory is the problem of causation. Lewontin and the critiques of sociobiology also claimed that in bad theories regarding human nature, such as sociobiology, theorists turn effects into causes, for example, “biological determinists use the concepts of nature and nurture as separate causes when developmental genetics long ago showed them to be inseparable” (Lewontin et al. 1984: 24). This nature-nurture division assigns explanatory epistemic roles that “involve locutions such as ‘X is due to human nature’, treating human nature as an explanatory category” (Kronfeldner 2018: 59). Confusing the categories of classification, description, and explanation rests, according to Kronfeldner, on an essentialist presupposition that nature

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5 This debate is also actual in contemporary cognitive science. The thesis of extended cognition, as proposed by Clark and Chalmers (Clark and Chalmers 2008) states that the cognition extends beyond the boundaries of a cognitive subject. For example, an interesting question would be: should we regard, following the parity principle proposed by Clark and Chalmers, the extended machinery used to generate speech, as in subjects that suffer from Amyotrophic Lateral Sclerosis, as the part of that subject’s cognitive system? The thesis of the extended mind could be shown valuable in rethinking the nature-nurture divide. Unfortunately, the scope of this paper doesn’t allow for treating this and similar questions, and in this paper, I will focus mainly on Kronfeldner’s strategy of dealing with the nature-nurture question.

(of a human species) has a monistic essence. Essentialist causation is usually theological, such as sociobiological “gene-causation” that describes the universal goals of human nature. The communication and socialization purpose of speech in Piaget’s theory of language would also be an example. Essentialism ignores that “nothing can be understood ahistorically” (Sober 2000: 7), and that “the ascension from the effect to the cause is pure historical understanding” (Vygotsky 1986: 42). For example, evolutionary psychologists defined the explanatory account of the evolution of the mind as an account of how and why the information-processing organization of the nervous system came to have the functional properties that it does (Barkow et al. 1992: 8).

The problem of reductive causation exists in general scientific methodology,<sup>6</sup> but regarding human nature, Kronfeldner points out the Darwinian challenge. Darwin’s theory of evolution is a combination of a Lamarckian idea of the common ancestor and the idea of natural selection as a factor of variability, adaptation, and heritability as processes of evolution. That implies that there is a division of questions of description and the question of explanation, as well as the division of labor in methodology and sciences: one question should have an answer in terms of structures: such as “how ivy plants manage to grow toward the light is to describe structures that cause the plants to do so”, and the other, in terms of processes: “the presence of these internal structures explains why the plants grow toward the light” (Sober 2000: 8). As Kronfeldner stated, the Darwinian challenge refutes essentialism, because, given the Darwinian ontology, there are no necessary and sufficient conditions for membership in a biological species (fulfilling the classificatory role of an essence) that are the same time explaining the traits characteristic of a kind (Kronfeldner 2018: xxiv). However, an essence fulfills all these roles: classificatory, explanatory, and descriptive. Essentialism, as well as simple reductionism, thus, cannot accommodate the Darwinian challenge. Evelyn Keller also describes the following nature-nurture divide that stems from the Darwinian challenge:

The first question is statistical. It asks about the percentage of variation in, say, IQ, that arises from inherited differences among individuals (do some parents pass on smart genes to their kids?) versus the percentage that arises from environmental differences (do some parents pass on books to their children?). The second question is mechanistic. It asks about how genes behave within individuals... (Keller 2010: 3)

According to Kronfeldner, the divide of questions can be regarded as a strengthening of a nature-nurture divide, but it can also be seen as a division

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<sup>6</sup> For example, physicalism is a reductionistic stance with a claim that all entities, states and processes in nature can be reduced to physical processes (Neurath 1931). There are many refutations of this stance, especially in the philosophy of mind, such as the problem of the subjective character of consciousness (Nagel 1974), the explanatory gap between functions and properties of a conscious experience (Levine 1983) and the epistemological inadequacy of physicalism (Jackson 1982). There are also many methodological problems with the physicalistic program, as shown in Chomsky (2000).

of the channels of inheritance. Firstly, “Anti-Lamarckism made it conceivable that culture is autonomous and human nature shared across all human groups”, or that nature is “universal” (Kronfeldner 2018: 64). The Lamarckian view requested the inseparability of “natural” and “cultural” causes: “culture was coupled with and reducible to nature since culture slowly but steadily and repeatedly becomes nature, habit becomes instinct, acquired becomes innate – all via the biological inheritance of acquired characteristics” (Kronfeldner 2018: 65). Anti-Lamarckism and Darwinian challenges show that heritability is not a one-to-one relationship: effects that descendants exactly resemble their ancestors almost never happen in organisms that have a sexual way of reproduction. (Sober 2000: 10). But, when nature and culture are decoupled, the take-off of cultural evolution amounts to an underdetermination of culture by nature<sup>7</sup> because of a one-to-many relationship (Kronfeldner 2018: 65). And nature and nurture are decoupled from the very first moment when the first animal managed to learn socially from another one, that is, from the moment of birth – if there was any concrete such date (Kronfeldner 2018: 66).

Decoupling of nature and nurture made possible constructivist theories of human capabilities, such as Piaget’s theory of language acquisition. But, treating nurture or culture as independent causal factors may lead to wrong correlations and causal chains: according to Vygotsky, “in his attempt to substitute functional explanation for the genetic explanation of causes, Piaget, without noticing this, made vacuous the very concept of development” (Vygotsky 1986: 42). The most serious consequence in Piaget’s theory, according to Vygotsky, is the wrong explanation of the function and development of the egocentric speech, correlated to autistic thinking. In trying to postulate social interaction as a main (“due to culture”) cause for which a child develops a language, paradoxically, Piaget created a barrier between a child and its environment, and regarded the first stage of language development, egocentric speech, as completely separated from reality, or fulfilling no function of the “realistic thinking”. Piaget’s theory of speech development postulates phases of development in a fixed order: 1. Unspoken autistic thinking, 2. Egocentric speech and egocentric thinking, 3. Socialized speech and logical thinking. That is because Piaget has a nature-nurture divide as a presupposition, where nurture is something external, which acts as an outside force regarding a child’s “nature”; while the original function of the child’s ontogenetic speech development is intimately individual and has no social function at all. Then, after the empirical influence of the environment, the child develops logic and meaningful speech, so, nurture has a complete shaping role for “unrealistic nature” that, after the process of

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7 For example, there is a symbolic-connectionist debate in studying “U-shaped” language acquisition and past-tense formation in cognitive sciences. Symbolic approach postulates two mechanisms – the rule application and lexical lookup, which directly modifies symbolic representations. In contrast, the connectionist approach explains past-tense formation by means of a single subsymbolic mechanism in feedforward connectionist networks (Abrahamsen and Bechtel 2006).

socialization, simply disappears. To Vygotsky, on the other hand, the scheme looks as follows: 1. Social speech, 2. Egocentric speech, 3. Inside speech (Vygotsky 1986: 35). Vygotsky postulates this scheme on an important function of the egocentric speech that shows objective, realistic and social characteristics regarding a child's nature: child's egocentric speech deals with problem-solving and clarification of its thoughts and is, in fact, developmentally the most important factor in transgressing of the external speech to the internal, or the relation between speaking and thinking. One problem that a relatively late development of autistic thinking shows is the biological unsustainability of Piaget's theory of developmental phases.

Another problem is that there is a coevolution, where there is nature via culture and culture via nature, not only ontogenetically but also phylogenetically, even though there are no "genes for" X, according to Kronfeldner. "An important philosophical consequence that can be derived from coevolution is that it revises the dualistic picture about the evolutionary relationship between biological and cultural inheritance" (Kronfeldner 2018: 84). In Vygotsky's theory of language, we have the nature of the speech constituted after the forced assimilation of inputs from the environment. But if we get rid of the essentialist and theological claims, the function of speech is not to serve as communication, but to serve as a problem-solving skill and clarification of one's thoughts, a hypothesis which the biolinguistics program will adopt. When the child talks to itself, it makes commentary regarding its environment, actions, problem-solving and thoughts, so it is highly "realistic" thinking, for example: "Where is the pencil? I need the blue pencil..." (Vygotsky 1986: 30). So, Piaget, in the effort to ascribe to a child's thinking development factors "due to nurture" created an unproved presupposition that a child's relation to reality in speaking and thinking is not "natural" but is a result of the social pressure to conform to the thoughts of others. From the outset, a child's mind is shaped to interact with "objective reality", and during the developmental process, the child employs egocentric speech and thinking as integral components of this development, rather than in opposition to (social) reality. Demarcation and division of the autistic nature and social reality leads to dualism, that, as shown, refutes the very concept of development:

The latter idea does not belong exclusively to Piaget. Recently, the same thought has been clearly expressed by Eliasberg in his study of so-called autonomous child speech. Eliasberg comes to the conclusion that the image of the world that appears in language forms does not correspond to a child's nature... Only through the speech of adults does a child acquire the categorical forms of subjective and objective... Such a conclusion is simply a natural outcome of the original view of social and biological factors as alien to each other. (Vygotsky 1986: 47)

At first sight, interactionism, with its recognition of the unique interaction between genes and environment in determining the organism, would seem to be the correct alternative to biological or cultural determinism. However, it also supposes the alienation of organism and environment, drawing a clean

line between them and supposing that environment makes an organism, while forgetting that the organism also makes environment<sup>8</sup> (Lewontin et al. 1984: 270). Secondly, it acknowledges the primacy of the individual's ontology over the collective one and, as a result, the epistemological adequacy of explaining individual development in the context of understanding social organization. The term development, in this way, is understood that "organisms, societies, cultures are seen as containing all that they ever are to be immanent in their earliest form and requiring only an initial triggering to set them off on their preset path of developmentally unfolding" (Lewontin et al. 1984: 271). This is, as Kronfeldner has shown, an Aristotelian essentialist claim: developmental unfolding that is often described in terms of stages that succeed each other in a fixed order. Theories of unfolding prioritize internal developmental factors, assigning the environment the role of initiating or impeding the process at various stages. In this sense, it embodies a model rooted in biological determinism. On the other hand, the challenge with constructivism and the attempt to define an independent environment is the multitude of ways in which the components of the world can be combined to create different environments. Organisms do not simply adapt to previously existing, autonomous environments; they create, destroy, modify, and internally transform aspects of the external world by their own life activities to make this environment (Lewontin et al. 1984: 273). We must not forget that "the genetic system itself is a product of evolution" (Sober 2000: 5). Neither the organism nor the environment is a closed system; each is open to the other. So, "development, and certainly human psychic development, must be regarded as a co-development of the organism and its environment, for mental states have an effect on the external world through human conscious action" (Lewontin et al. 1984: 275).

## 2. The Developmentalist Challenge: Piaget and Chomsky

Separating nature and culture (and also the environment) in the way described has been attacked because it leads people to ignore the interactions of nature, culture, and environment at the developmental, intergenerational, and evolutionary levels (Kronfeldner 2018: 67). Anette Karmiloff-Smith says that nativists as well as evolutionary psychologists use the early developed capabilities

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8 For the continental discourse on the problems of this kind of relationship between the individual and the environment, see, for example, Adorno and Horkheimer: "The strength to stand out as an individual against one's environment and, at the same time, to make contact with it through the approved forms of intercourse and thereby to assert oneself within it... represented a tendency deeply inherent in living things, the overcoming of which is the mark of all development: the tendency to lose oneself in one's surroundings instead of actively engaging with them, the inclination to let oneself go, to lapse back into nature" (Horkheimer and Adorno 2002: 188–189); and Latour: "If we do not change the common dwelling, we shall not absorb in it the other cultures that we can no longer dominate, and we shall be forever incapable of accommodating in it the environment that we can no longer control... It is up to us to change our ways of changing" (Latour 1993: 145).

of infants as a confirmation of their claims, but the specialization and localizations are very *gradual* (Karmiloff-Smith 2001: 189). In studying developmental disorders, she concludes that “abnormal brain is not a brain with some intact parts, it is a brain that develops in a different way during embryogenesis and postnatal development of the brain” (Karmiloff-Smith 2001: 184). For example, Williams syndrome is used as an argument for domain specificity and modularity of the brain, since the capabilities of language and face recognition, which are intact in Williams syndrome, function simultaneously with other intellectual abilities that are defective. This view, however, lies in the nativist presupposition (refuted in the nature-nurture decoupling) that genes and behavioural outcomes are mapped in one-on-one relationship. Karmiloff-Smith shows that children with Williams syndrome successfully solve tasks of face recognition using different strategies. Processes which children and adults with Williams syndrome use to learn new words are not subject to the same lexical constraints as in normal children. “For instance, normal children expect new words to refer to whole objects unless they already know the name of the object. People with Williams syndrome, by contrast, take a new word to refer just as readily to a part of an object” (Karmiloff-Smith 2001: 188). Behaviour cannot, therefore, according to Karmiloff-Smith, be directly mapped to the cognitive processes in the back because some behaviour can be an effect of a developmental delay. The alteration occurs in the learning process itself, leading to distinct cognitive abilities: numerous components within the system mutually evolve, with various phases initiating at the early stages of a developmental event, and multiple layers of interaction are harnessed to gradually build complexity. So, the answer to the false dichotomy cannot be evolution *or* ontogenesis because development relies on both: what is important is the gradual process of ontogenesis, in which a child enters in interaction with the abundance of environmental input (Karmiloff-Smith 2001: 192). The influence of modularity and domain specificity does not necessarily require a developmental origin that is itself modular or domain specific.

A famous debate between Jean Piaget and Noam Chomsky regarding the acquisition of linguistic competence took place in Paris in 1975. The debate also delved into a much broader spectrum of issues concerning the fundamental nature of the mind and the origin and acquirement of cognitive capabilities. These included questions about whether this capacity is uniform across various species and domains or instead varies by species and task, whether its development represents genuine learning, characterized by what Piaget described as “authentic constructions with stepwise disclosure of new possibilities”, or resembles a genetically pre-programmed maturation, simply involving the “actualization of a set of possibilities existing from the beginning”. Additionally, the discussion explored the role of interaction with the environment, debating whether it has a “shaping” function or merely serves as a “triggering” mechanism (Marras 1983: 277–278).

According to Piaget, constructivism is the best theoretical framework to explain the precise patterns of cognitive development. Piaget’s form of

constructivism presupposed a kind of evolution that is “unique to man”, and which grants the “necessity” of the mental maturational stages. The transitions between one stage and the next are formally constrained by “logical necessity” and dynamically come about by processes of nature-nurture interactionism (Piatelli-Palmarini 1994: 320). The transition is marked by the attainment of more advanced concepts and frameworks. Once these are reached, they remain fixed and encompass the specific concepts and frameworks of the previous stage. Piaget’s theory of language acquisition proposed a developmental progression in human cognition from infancy to adulthood, involving distinct, qualitatively different stages that are universal across cultures, although some cultures may not reach the highest stages. However, the problem for Piaget’s theory was that the necessary and invariant nature of these transitions cannot be captured by the Darwinian process of random mutation plus selection (Boeckx 2014: 88). Chomsky’s suggestion was that one should not establish any dualism between body and mind, and that we should approach the study of “mental organs” exactly the way we approach the study of the heart, the limbs, the kidneys, etc. (Piatelli-Palmarini 1994: 324). Opposed to Piaget’s generality, he argued for specificity and relied on concrete instances of language (Piatelli-Palmarini 1994: 327–328), such as:

The simplest and therefore (allegedly) most plausible rule for the formation of interrogatives:

The man is here. Is the man here?

Is the following (a “structure-independent” rule): “Move ‘is’ to the front”. But look at:

The man who is tall is here.

\*Is the man who tall is here? (bad sentence, never occurring in a child’s language)

Is the man who is tall here? (good sentence)

The “simple” rule is never even tried out by the child, Chomsky concluded, and asked an explanatory question – “Why?” The correct rule, uniformly acquired by the child, is not “simple” and involves abstract, specifically linguistic notions such as “noun phrase” (Piatelli-Palmarini 1994: 328). Children don’t try the formulation of sentences by trial and error, and their relevant experience is lacking. This amounts to the famous argument from “poverty of stimulus”: “it is reasonable to conclude that the child’s knowledge... derives from initial endowment” (Chomsky 1980: 160).

Piaget drew a distinction between structures and functions (the *how* and *why* questions), claiming that although some cognitive functions are innate, no cognitive structures are. He regarded language learning as an integral part of cognitive development, with an onset coinciding with the formation of the “semiotic function” at a specific and relatively fixed stage of cognitive development, made possible by the acquisition of previous non-linguistic structures which constitute the preconditions for language learning (Marras 1983: 280). It is crucial for Piaget, according to Marras (1983) that the autoregulatory

mechanisms active in cognition are a special case of universal biological mechanisms which are operative all the way from the cellular to the complex behavioural level: Piaget's biological model of cognitive construction is "phenotypic adaptation", that uses the phenomenon of "phenocopy", which he equates with "genetic assimilation" – a phenomenon which for Piaget involves "a genetic or gene-linked reconstruction of an acquisition made by the phenotype"... As Piaget states it, the central problem for constructivism is to understand how new operations and structures come about and why, even though they result from non-predetermined constructions, they eventually become "logically necessary" (Marras 1983: 280).

The account is that a "fixed nucleus" containing a set of structures or schemes is accessible to the child from the very beginning of the representational ability of "semiotic function". Precisely because of this alleged "necessity", Piaget will argue against Chomsky that no cognitive structures can plausibly be thought to be innate (Marras 1983: 280).

In contrast to Piaget, Chomsky presented ideas regarding the specific content of the fixed nucleus. Essentially, he associated it with the (innate) system of universal grammar, which is believed to form the foundation of linguistic competence and act as a "prerequisite" for its development. Specific features of universal grammar (and thus of fixed nucleus) which Chomsky discussed are the "structure dependency" of rules and the "specified subject condition". We should suppose these mechanisms to be innate because:

In studying the process of language acquisition, ... we observe that a person proceeds from a genetically determined initial state through a sequence of states, finally reaching a 'steady state' S. Investigating this steady state, we construct a hypothesis as to the grammar internally represented... (Marras 1983: 285)

For, as Chomsky sees it, "the issue is not to account for the stability of the fixed nucleus; rather, it is to account for its specific character" (Marras 1983: 286). In separating linguistic "competence" from linguistic "performance" Chomsky (1965), sought to accomplish two goals: (1) to focus attention on the knowledge of speakers of natural languages about the well-formedness and grammaticality of possible utterances in those languages, and (2) to provide a justification for directing attention away from the "how" of language, the biological capabilities that make it possible to implement knowledge in speaking and understanding languages (Oller 2008: 344). Evidently, the growth of language in the individual ("language learning") must involve the three factors that enter the development of organic systems more generally: (i) genetic endowment, which sets limits on the languages attained; (ii) external data, which select one or another language within a narrow range; (iii) principles not specific to the language faculty. The theory of genetic endowment is commonly called "universal grammar" (Chomsky 2010: 51).

The key question, according to Piaget, in the constructivist/selectionist debate, whether it is at the ontogenetic or phylogenetic level, is whether an

established structure represents a truly new acquisition independent of genetic determination – “an authentic disclosure of new possibilities”, or whether it merely involves the manifestation of something genetically preprogrammed – “the actualization of a set of possibilities existing from the beginning” (Marras 1983: 284):

In tracing the constructive mechanism of autoregulation down to the organic level, Piaget entertains the hypothesis of a mechanism “which is as general as heredity and which even, in a sense, controls it”. This mechanism would thus have the power to overstep the constraints of the genetic program and even to rewrite it. No non-Lamarckian evolutionary theory allows for such transfer of structure from phenotype to genotype; except through (random or artificially induced) mutation... As a biological, evolutionary hypothesis, constructivism does not appear to provide a viable alternative to natural selection; if a structure is innate, it could only have evolved by mutation and selection. This conclusion has the following consequence: if Piagetian constructivism is to be sustained, it must be sustained independently of its dubious biological underpinning – that is, merely as a developmental psychological theory. (Marras 1983: 284–285)

The conclusion of the Piagetian constructivist programme, then again, rests on the essentialist presupposition, that everything developed is already contained within the innate system that is developing. And this essentialist view rests, as we have seen, on the presupposition of the nature-nurture divide:

The non-biologist frequently and mistakenly thinks of genes as being directly responsible for one property or another; this leads him to the fallacy, especially when behavior is concerned, of dichotomizing everything as being dependent on either genes or environment. It might be more fruitful to think of maturation as the traversing of highly unstable states, the disequilibrium of one leading to rearrangements that bring about new disequilibria, producing further rearrangements, and so on until relative stability, known as maturity, is reached. (Miller and Lenneberg 1978 in Marras 1983: 291)

### 3. Bilingualistics: The Stability of Human Language Faculty

The term “bilingualistics” was proposed in 1974 by Massimo Piattelli-Palmarini as the topic for an international conference he organized that brought together evolutionary biologists, neuroscientists, linguists, philosophers, and others concerned with language and biology. At that time, according to Boeckx (2014), everyone clearly steered from behaviourism and assumed that there were biological foundations of language worth looking for, “the limits of the genetic contribution to culture, the boundaries or the *enveloppe génétique* in shaping the human mind” (Piattelli-Palmarini 2001 in Boeckx 2014: 84). A primary focus of the discussions was the extent to which apparent principles of language are unique to the specific cognitive system, one of the basic questions to be asked from the “biological point of view” and crucial for the study of development of language in the individual and its evolution in the species. In terminology

used more recently, the “basic questions” concern the “faculty of language in the narrow sense” (Chomsky 2010: 45). The naturalistic studies of Darwin’s close associate and expositor Thomas Huxley led him to observe, with some puzzlement, that there appear to be “predetermined lines of modification” that lead natural selection to “produce varieties of a limited number and kind” for each species (Chomsky 2010: 51). According to Chomsky, over the years, in both general biology and linguistics, the pendulum has been swinging towards unity, yielding new ways of understanding traditional ideas. Research programs that have developed have some similarity to conclusions of the so-called “evo devo” revolution that “the rules controlling embryonic development” interact with other physical conditions “to restrict possible changes of structures and functions” in evolutionary development, providing “architectural constraints” that “limit adaptive scope and channel evolutionary patterns” (Chomsky 2010: 51). Pointing out how developmental considerations have led to a shift in perspective in the “evo devo” view in biology, is bringing new focus on phenotypic development, rather than on genetic variation as the point of departure for evolutionary analysis (Larson et al. 2010: 9).

Linguists of the emerging tradition in the 1960s and 1970s came to view “data” as primarily, if not solely, the grammatical assessments provided by native language speakers. Biolinguistics, on the other hand, argues that language’s fundamental purpose is not communication but, instead, “the expression of thought”. This notion is linked to the belief that language did not evolve as a communicative system under the influence of selection pressures. If we remember Vygotsky’s claims, that can be supported in the light of a child’s development of egocentric speech and its realist function that has to do with clarification of one’s thoughts and actions.

A second failure of interactionism, according to Lewontin, Rose and Kamin (1984), after the problems of essentialism in the theories of unfolding, is that it is unable to come to grips with the fact that the material universe is organized into structures that are capable of analysis at many different levels:

Conventional scientific languages are quite successful when they are confined to descriptions and theories entirely within levels. What is not so easy is to provide the translation rules for moving from one language to another. This is because as one moves up a level the properties of each larger whole are given not merely by the units of which it is composed but by the organizing relations between them. (Lewontin et al. 1984: 278)

Interactive explanations claim that to the goal-directed (and evidently theologically caused) organism, there are multiple paths to a given end. But there is a danger of confusing the epistemological plurality of levels of explanation with the ontological assumption that there are really many different and incompatible types of causes in the real world (Lewontin et al. 1984: 281). Holistic and reductionist accounts of phenomena are, therefore, not “causes” of those phenomena but merely “descriptions” of them at particular levels, in particular scientific languages. The language to be used at any time is contingent on

the purposes of the description; difference of purpose should define the language of description to be used (Lewontin et al. 1984: 282).

The difference of levels of descriptions is known as the problem of incommensurability. Incommensurability of the causal relevance of nature and nurture can be compared to the incommensurability of the causal contribution of two people building a wall, with one bringing bricks and the other the mortar. Following the illustrative example of Lewontin in Kronfeldner (2018), if we imagine that Suzy brings the bricks and Billy the mortar, the contributions of Suzy and Billy cannot be compared quantitatively since they contribute in qualitatively different ways to the wall (Kronfeldner 2018: 72). Similarly, in the philosophy of mind, Gilbert Ryle (1949) refuted Cartesian dualism in a critique of a category mistake that exists when we say “something mental is happening” and when we say “something physical is happening”. Cartesian dualism regarded the mind and the body as the same explanatory categories. Descartes searched for mental mechanisms that underlay mental processes in the same way in which the physical mechanisms underlay physical processes. But mind and body are different categories of things. Mind is a way in which the physical is organized, in a similar way to which a university is not another building in addition to the buildings that form the university, it is a way of organizing its integral components (Ryle 1949: 18).

Biolinguistics describes the development of linguistic processes by adopting something that Charles Sanders Peirce regarded as the abductive process of forming conclusions. The abductive conclusion can be regarded as a following inferential structure:

Recognizable type of object M has characteristics which are distinctly recognizable;

Presented object S has the same characteristics  $p_1, p_2, p_3$ , etc.;

Therefore, S is species M. (Peirce 1891: 32).

The Peircean point was that through ordinary processes of natural selection, our mental capacities evolved to be able to deal with the problems that arise in the world of experience (Jenkins 2000: 36). In the abductive process, the mind forms hypotheses according to some rule and selects among them with reference to evidence and, presumably, other factors. It is convenient sometimes to think of language acquisition in these terms, according to Chomsky, “as if a mind equipped with universal grammar generates alternative grammars that are tested against the data of experience with the most highly valued one selected” (Chomsky 1980: 136).

Quite generally, construction of theories must be guided by what Charles Sanders Peirce a century ago called an “abductive principle”, which he took to be a genetically determined instinct, like the pecking of a chicken. The abductive principle “puts a limit upon admissible hypotheses” so that the mind is capable of “imagining correct theories of some kind” and discarding infinitely many

others consistent with the evidence. Peirce was concerned with what I was calling “the science-forming faculty”, but similar problems arise for language acquisition, though it is dramatically unlike scientific discovery. It is rapid, virtually reflexive, convergent among individuals, relying not on controlled experiment or instruction but only on the “blooming, buzzing confusion” that each infant confronts. The format that limits admissible hypotheses about structure, generation, sound and meaning must therefore be highly restrictive. The conclusions about the specificity and richness of the language faculty follow directly. Plainly such conclusions make it next to impossible to raise questions that go beyond explanatory adequacy – the “why” questions... (Chomsky 2007: 17)

Explanatory questions about the evolution of language can be seen in light of the solution to the incommensurability problem in Kronfeldner and with the nature-nurture dichotomy: since the contribution of “nature” and “nurture” cannot be quantitatively measured, we must find “different differences to respected explanandum”:

Language is another example: people differ regarding the concrete languages they speak. Some speak English, some Japanese, some this, some that. The differences in their language are exclusively due to differences in developmental resources traveling by cultural inheritance. Which language one speaks is thus due to culture alone. This holds even though biologically inherited developmental resources are necessary to produce organisms that have a language. None of the individuals would speak either of the concrete languages without also having had thousands of developmental resources available that travel through the channel of biological inheritance. The difference in their language (language now taken as something abstract) is an abstraction from the comparison of the concrete languages they speak... (Kronfeldner 2018: 160)

This issue of abstraction, or the problem “that there is neither a priori argument on where abstraction has to stop nor any general empirical rule where to stop” (Kronfeldner 2018: 132) has to do with traits typicality. There is a simultaneous danger of our descriptive account to be too thin, with regress uncovering typical traits as being abstractions from disjunctions; and too thick, with regress spreading toward all differences being included in the nature of capabilities (Kronfeldner 2018: 137). In an explanatory sense, we can refer to the developmental resources that are typical and biologically inherited. We saw the problems with essentialist presuppositions in descriptive accounts and explanations – they ignore interactionist consensus and regard the explanatory essence and the developmental process as first being a fixed, innate property and second acting as a trigger for actualizing that property. Kronfeldner offers the concept of *stability* to replace fixity. The innateness of mechanisms of language can be seen in the light of the human-animal boundary, or claiming that human language is species specific, but that account will only amount to the classificatory role of human language. Although classificatory accounts can be explanatorily relevant and have a part in descriptive accounts, “traits do not have to be species specific to belong to the descriptive or explanatory

nature of humans” (Kronfeldner 2018: 201). Another important thing is that populations of individual organisms show typicality understood as similarity not only in space – synchronically, but also over time – diachronically (Kronfeldner 2018: xxvi). This typicality, for Kronfeldner, can be seen as stability.

As per Kronfeldner, resources need to endure to consistently bring about the characteristic properties of a species over an extended period. Their endurance leads to the coherence and stability of a species, which in turn ensures the stability of the associated cluster of properties. If things do not simply persist (such as mountains separating two populations), they must be transmitted to the next generation by biological or cultural transmission (Kronfeldner 2018: 157). The stability over time results from the fact that traits that are part of human nature rely on resources that travel the biological channel of transmission, which has a high stability built in because biological factors can rarely change from a vertical to another mode of transmission (Kronfeldner 2018: 157). Traits that are “due to culture” are traits that may vary, but for which the conditional (or respective counterfactual) holds: if they vary, the difference between them relies on a difference in developmental resources transmitted by cultural inheritance. “Speaking English” (rather than another concrete language) would be a case in point (Kronfeldner 2018: 166).

The explanatory account of human traits, then, according to Kronfeldner, is a statistical cluster of biologically inherited developmental resources that happen to be prevalent and stable over a considerable time in the evolutionary history of the human species (Kronfeldner 2018: 185). The explanatory nature is a historically and statistically individuated entity: a property of a population that changes over evolutionary time. The organism is not the system that bears the alleged explanatory nature, one must move to a populational level to make sense of a species’ nature (Kronfeldner 2018: 185).

We saw that, at a minimum, knowledge of language includes a system of computation that computes such structures as *Is the child that is in the corner happy?* Furthermore, some properties of these computations, such as structure-dependence, appear to be part of our genetic endowment. So, children are able to acquire language by (i) accessing their UG (universal grammar) and (ii) processing data input with information in order to set the parameters for a specific language. Finally, we can inquire into the evolution of our genetic endowment for language by, for example, searching for and investigating genes associated with human language. (Di Sciullo and Jenkins 2016: 206)

According to Kronfeldner, one can even play the game of highlighting or ignoring differences to have effects that are due to one kind of causal factor alone:

Imagine a gene known to be relevant for language development (e.g., the FOXP2-gene, the putative “language gene”, coding for the Forkhead box protein P2). Imagine that it influences whether an individual can develop a full-blown spoken language or suffers from some severe limitations... Although the production of every individual’s specific language ability is due to nature and nurture, it is still possible to say that the FOXP2-gene makes a difference to the difference

between having a full-blown spoken language or not and the environmental factor makes a difference to differences in specific spoken languages, that is, a difference to which specific language an individual speaks (regardless of whether it has the FOXP2-caused impairment). (Kronfeldner 2018: 161)

If we ask classificatory questions about human language such as questions about human language specificity; or descriptive questions, such as “how do humans speak?”, we can have accounts from separate sciences, such as phylogenetics and anatomy or linguistics. However, if we ask an explanatory question of – why humans have the language faculty they do, we will need to take into account the evolutionary factors as well as the environmental ones. That is, an interdisciplinary framework is needed.

## Conclusion

The division of descriptive and explanatory labour as well as the problem of underdetermination and making category mistakes shows that we can have different classifications or descriptions of a given phenomenon or capability, but explanations require their own framework. Problems of the methodology of investigation “human nature capabilities” show that different stances such as reductionism of gene-determinism and sociobiology, the dualism of nature-nurture divide, the problems of interactionism and causal essentialism also stem from the need for integrative explanation. That aim can be described by not falling into the mistake of confusing pluralism of levels of description, with the plurality of phenomena investigated. That is a realistic claim. Kronfeldner states realism in a “search for mind-independent property” (Kronfeldner 2018: 9). Bilingualistics, as an interdisciplinary science, is aware of the needed choice regarding *what* trait differences make a difference and searching for different explanatory goals for different science fields. If we regard explanatory account as a “stable property that expands over space and time” that answers to the question of “why is it the way it is”, we can see that diving into, on the one hand, description of mechanisms responsible for language acquisition in psychological terms, and on the other, biological processes and states that underlie them, as well as the interaction of biological processes and cultural inheritance that make possible the transmission of given capability, different explanations are expected. We must not fall into the pits of reductionism, such as biological or cultural determinism, but accept the effects of both factors in constituting the explanatory nature of a given phenomenon. The problems of dualism and incommensurability in interactionism show that there is a plurality of approaches regarding different descriptions of a given phenomenon. If we opt for an explanatory account, we need to find complementary explanations from different disciplines. That means that an interdisciplinary research programme is needed, with a focus on the “why questions” that, on different levels and in different structures, show unifying potential. The explanatory account of language faculty can be seen as particularly important today, in the

rise of artificial intelligence and artificial language systems, such as Chat-GPT. The phenomenon of cognition can soon be in the same status as the concept of human nature, that is, defended on the basis of species-typicality, dogmatic beliefs and theological objections.<sup>9</sup> The language faculty, as a part of human cognitive capabilities, can be seen in a priori opposition to artificial neural networks and machine learning, defended on unscientific claims and motivated by human (nature) centrism. In this setting, challenging the concepts of human nature and the explanatory analysis of human capabilities can be seen necessary and fruitful. Kronfeldner's division and revision of human nature can be a good strategy for challenging human nature's capabilities and related phenomena, such as cognitive systems and human language faculty, but may be also many more capabilities (previously) ascribed (specifically) to humans.

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<sup>9</sup> Alan Turing, back in the 1950, claimed that the impossibility of machine thinking is defended on theological and dogmatic basis, reminding us that a statement "only humans have immortal souls, therefore only humans have consciousness and are able to think" can be seen in relation to the Muslim view that women do not have immortal souls, that is, to (dangerous) dogmatic beliefs (Turing 1950: 451).

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Ana Lipij

## Objašnjenja ljudskih jezičkih sposobnosti: razvojni izazov i biolingvistika

### Apstrakt

Cilj ovog rada jeste istraživanje primene analize pojma ljudske prirode Marije Kronfeldner na pojam kognitivnih sistema i povezanih sposobnosti, kao što je ljudska jezička sposobnost. Na početku ćemo se pozabaviti debatom priroda-odgoj, odnosno eksplanatornom tvrdnjom o prirodi kao uzročnoj ulozi jezičke sposobnosti, i eksplanatornim tvrdnjama koje kulturu smatraju odgovornom za razvoj ljudskih jezičkih sposobnosti. Podela priroda-odgoj generiše problem jer ignoriše činjenice interakcije prirode i kulture tokom razvoja jezičkih sposobnosti, problem koji se naziva razvojni izazovom. Pokazaćemo različita stanovišta koja pokušavaju da odgovore na ovaj izazov, kao najpoznatije, konstruktivističku teoriju Žana Pijažea i teoriju univerzalne gramatike Noama Čomskog. Sledeći uvide Kronfeldnerove, ukoliko se odlučimo za eksplanatorno (a ne klasifikatorno ili deskriptivno) objašnjenje ljudskog jezika tražićemo eksplanatorne epistemičke uloge i ono što ih ispunjava. Kako tvrdi Kronfeldnerova, različite discipline traže različite razlike u pogledu eksplananduma, i, pokušaćemo da pokažemo, postoji potreba za integrativnim interdisciplinarnim okvirom koji se bavi kognitivnim sistemima. Zaključak je da je biolingvistika jedna od oblasti sa potencijalom za interdisciplinarno ujedinjenje objašnjenja koja se tiču ljudskih jezičkih sposobnosti.

Ključne reči: govorna sposobnost, dualizam priroda-odgoj, razvojni izazov, debata Pijaže-Čomski, biolingvistika.

