Teaching pro-environmental rules: Implications for environmental education and climate change

La formación en reglas proambientales: implicaciones para la educación ambiental y el cambio climático

Leidy-Vanessa DÍAZ-BELTRÁN[1]. Teacher. Secretariat of Education, Colombia (*vanessadiazb@gmail.com*).
Pablo PÁRAMO, PhD. Professor. Universidad Pedagógica Nacional, Colombia (*pdeparamo@gmail.com*).

Abstract:

The concern regarding the gap between *words* and *actions* has spread through different contexts, in particular those relating to environmental education. Despite repeated warnings about the damaging impact of human behaviour on the environment and the effect of actions undertaken to teach people to protect the environment (pro-environmental behaviours), there have been few advances in relation to favourable responses from people's *actions*. The alternatives proposed in environmental education to reduce this gap include research relating to teaching pro-environmental rules and its impact on human behaviour. Rule learning poses challenges for the comprehension of human behaviour, especially for environmental education in general and climate change in particular as well as being proposed as an epistemological and theoretical approach to human behaviour insofar as it differs from the established approach in physiological, medical, attitudinal, cognitive, or motivational mediation models that explain behaviour on the basis of factors that are internal to the individual. This article discusses the origins, genetic or environmental [Chomsky (1959) *vs.* Skinner (1957, 1981)], of verbal behaviour with regards to its origin and development in ontogenesis. Afterwards, it considers the notion of *rule-governed behaviour* with the definitions and different taxonomies that have been proposed regarding rules, as well as the variables associated with (in)sensitivity to following them and the possible alternative approaches for each of the (in)sensitivity factors identified. Finally, it analyses the role of education in pro-environmental rules for regulating people's own behaviour and in the design of macro- and

metacontingencies to incentivise environmental protection in large human groups.

Keywords: pro-environmental behaviour, universal grammar, verbal regulation, rules-governed behaviour, environmental education.

Resumen:

La preocupación causada por la brecha existente entre el *decir* y el *hacer* permea diferentes contextos, en particular aquellos relacionados con la educación ambiental. A pesar de las reiteradas advertencias sobre las implicaciones del comportamiento humano en el detrimento ambiental y de las acciones emprendidas para la formación en pro de la protección del medio ambiente (comportamientos proambientales), pocos son los avances que se han logrado con relación a las respuestas favorables desde el *hacer* de las personas. Entre las alternativas planteadas en la educación ambiental para reducir esta brecha se encuentra la búsqueda relacionada con la formación en reglas proambientales y su implicación en el comportamiento humano. El aprendizaje por reglas no solo se propone como aproximación epistemológica y teórica del comportamiento humano. Además, en la medida en que se aleja de la visión establecida en modelos mediacionales fisiológicos, médicos, actitudinales, cognitivos o motivacionales (que explican el comportamiento a partir de factores internos del individuo), plantea retos para la comprensión del comportamiento humano; en especial para la educación ambiental en general y para el cambio climático en particular. El presente artículo discute los orígenes, genéticos o ambientales [Chomsky (1959) *vs.* Skinner (1957, 1981)], de la conducta verbal en cuanto a su nacimiento y desarrollo en la ontogénesis. A continuación, aborda la noción *conducta gobernada por reglas* con las definiciones y diferentes taxonomías que se han propuesto sobre las reglas, así como las variables asociadas a la (in)sensibilidad para seguirlas y los posibles abordajes alternativos a cada uno de los factores de la (in)sensibilidad identificados. Por último, analiza el papel que juega la educación en reglas proambientales en la regulación del propio comportamiento, así como en el diseño de macro- y metacontingencias para incentivar la protección del medio ambiente en grupos humanos amplios.

Palabras clave: comportamiento proambiental, gramática universal, regulación verbal, conducta gobernada por reglas, educación ambiental.

1. The origin of language

Although different learning mechanisms for explaining behaviour have been explored, such as learning by association (Pavlov, in Gutiérrez 2005), action by direct consequences in the environment, or operant conditioning (Skinner, 1938, 1953), imitation (Bandura & Walters, 1959), and cognition (Broadbent, 1958; Neisser, 1967; Piaget, 1978), mechanisms that are largely shared with non-human animal species, the principal mechanism

by which people learn is verbal regulation, which occurs through the use of language.

Within evolutionary theory there are various hypotheses regarding how communication systems might have evolved in different animal species, many of which are contradictory; however, all of these hypotheses agree that language is a specific capacity of the human being that exceeds the ones perceived in non-human animal behaviour and is the principal mechanism in the creation of culture.

Attributing verbal behaviour (not communication) exclusively to the human species recognises the difficulty of accurately deciphering language's origin owing to the lack of records and to the scarcity of evidence (it does not leave a fossil record), with there being only a few products such as writing. Archaeological proofs only date back to the origin of writing, some five thousand years ago, a period in which the critical genetic changes in *Homo sapiens* had already occurred and the rules of speech had already been established uniformly in all of the world's societies. However, there are a few patterns in speech that can be cited as products of evolution. One of these traces is the rhythm of turn-taking in conversations; when the conversational intervals of speakers of ten languages from all over the world were measured, it was found that they all avoided overlapping (but not interruption), and it was observed that the duration of the time between conversation and conversation was almost the same (Sauter et al., 2010).

Another trace of early linguistic evolution that has recently been documented is found in non-verbal vocalisations, exclamations that are probably older than language. It has, for example, been observed that vocalisations that communicate negative emotions (anger, disgust, fear, and sadness) are the same for native speakers of English in Europe and for speakers of the Himba language, which is only spoken in a few culturally isolated villages in northern Namibia. In contrast, non-verbal vocalisations that communicate positive emotions (achievements, fun, sensual pleasure, and relief) do not match in the same way, although the reasons for this difference are unknown (Sauter et al., 2010).

Consequently, it is clear that from an early-stage human beings started to display sensitivity to social interactions or contingencies2 in the development of language. In this way, it is important to underline the role of operant conditioning (Skinner, 1986), which suggests that the conditions for the emergence of verbal behaviour arose when the capacity to exercise control over the phonological apparatus was selected for by evolution, not as a result of natural selection but of the verbal social setting and its variations.

From this perspective, although the existence of verbal behaviour is initially conditioned on the genetic changes that the human species undergoes in most of its vocal organs, starting with a low larynx that makes vocalisation possible, a feature that is absent in our primate

cousins and in children aged under two years (Lieberman, 1998), language emerges with the development and operant control of the phonological articulation apparatus. This difference, in physiological changes in humans stands out even more for "an increase in general learning abilities or intelligence" (Álvarez-González, 2010, p. 5), and for humans' condition as social beings. All this marks an advance in verbal behaviour that goes beyond genetics and leads to it being controlled by the consequences of the social environment linked to action and imitation.

Humans have had evolutionary success thanks to the social skills that they have developed; the crucial difference between humans and other animal species, including our closest genetic relatives, chimpanzees, is the capacity to collaborate to achieve shared goals and intentions (Tomasello, 2016).

This evolutionary stage of the human species emphasises the role that social reinforcement contingencies fulfil on human behaviour on the basis of modelling, that is, the exhibition of the behaviour of one individual in front of another. In this process, the way people act is, on the one hand, linked to the interest in achieving the same as the person who modelled the behaviour; on the other, to the possibility that the behaviour can be generated or inhibited through a gesture without the need for the listener to experience the result of the behaviour directly. Within this explanation, the prior experience of giving instruction

also stands out so that the listener, acting on these instructions, receives reinforcing contingencies that will at the same time be reciprocal for the speaker. In this way, the evolution of language is not related to organs or to knowledge, but to the cultural milieu.

In contrast with this approach, Chomsky, from biological and linguistic anthropology, delegates language principally to innate linguistic structures, the result of biological evolution and natural selection, which he synthesises in a set of norms on which he bases the existence of a deep or universal grammar in the brain. According to him, human beings possess an innate language acquisition module (Chomsky, 1959). Chomsky argues that a language with all of its added grammatical rules is too complex for a child to be able to learn its grammatical structure in such a short period (children start speaking between 12 and 18 months in age and are very soon able to construct their own phrases and correct themselves grammatically). The phoneme that a child hears from its mother in its first years of life takes on a different meaning and triggers markedly different responses to those that the same phoneme might trigger in a young chimpanzee, something that can be attributed to the linguistic structure that precedes language in children.

Chomsky not only criticises Skinner but also Wittgenstein and Quinne, who stress social influence on language, as this seems superficial and trivial to him

because it is impossible to carry out a scientific analysis of the social influence on the development of language given the many variables that are at play when we use it (GramaPsico, 2023). Chomsky also supports his point of view by elaborating a series of norms that, as he claimed, albeit lacking further evidence (and somewhat unclearly), are spontaneously followed in the developing brain, minimising the role of the environment and learning in language acquisition.

The criticisms Chomsky made were refuted by MacCorquodale (1969), who established that they were irrelevant owing to Chomsky's lack of understanding of Skinner's proposed approach. According to MacCorquodale, Chomsky's comments on Skinner basically centred on the style of the work and on references to Skinner's work with rats. Thus, he left aside valuable arguments Skinner made when he removed the individual's dualist condition, according to which the individual exercises autonomy through thought. Skinner argued that thought is not the cause of behaviour, including verbal behaviour, but that it is also the result of operant conditioning, in particular through social contingencies or consequences.

The speaker is not an autonomous agent, Skinner argues in his book *Verbal behavior*. Verbal behaviour is regulated by the multitude of effects that can be obtained within the variations of the social setting, thus differing from the *tabula rasa* vision of Watson and Hull's cognitive one, on which

Chomsky apparently based his critique. Skinner considers verbal behaviour to be the result of what is provided by a regulating variable, social contingency, that is represented by listening and by supplementary variables such as education through the use of books, music, educational games, and the positive reinforcement that parents provide when children use language correctly in family conversation.

After many debates about the innate or cultural character of the origin of language, it is currently accepted that there is an instinctive component in language learning, a predisposition, as Pinker (2007) argues, but also that there is a sensitive period in the child's development where this learning can happen quickly, and it also accepted that that the existence of a special module for grammar in the brain is not an unavoidable necessity for explaining it. As for many other behaviours, there is a "preparation for learning", or pre-adaptations, as shown in various studies with animals collected in the works by Seligman and Hager (1972) and Marler and Terrace (1984) and the observations of the sociobiologists (Wilson, 2000; Alcock, 2001), but with few limitations for the development, particularly of language in humans.

One useful concept here is that of closed and open instincts and programs (Midgley, 1978). According to the author, closed instincts are behavioural patterns that are fixed genetically in every detail, such as the honey dance of bees,

the song of some birds, and the pattern of nest building of weaverbirds. Open instincts, on the other hand, are behavioural programs that have a void. Parts of the behavioural pattern are innate, determined, but others are completed in the programme with experience. Experience must *imprint* it. This is the simplest type of open instinct. However, even the simplest animals carry out activities in which the space left for experience has to be much broader, but the general objective is still innately determined. This appears to be the case with language and with many other behaviours in both humans and other non-human animal species.

As Wilson (2012) states, there seems to be a genetic rule biased towards the subject, verb, object word order integrated into our biological structure, although its end products in grammar are very flexible and are learned. The multitude of pathways in the evolution of basic syntax suggests that there are few if any genetic rules that guide the learning of language by individual human beings. So, as Wilson states, it seems that Chomsky is partly right, but Skinner is more so when he emphasises learning.

Why is there so little emphasis on the innate component of language? Because the rapidly changing environment of speech does not provide a stable environment for it to have been affected by natural selection. Language varies too quickly over generations and from one culture to another for it to have been the results of evolution by selection. Consequently,

there are few reasons to expect that the arbitrary properties of language, including the abstract syntactical principles of the phrases and the mark of genes, have been integrated in a special "language module" in the brain through the process of natural selection, according to Wilson (2012).

As a result, scholars of the origin of language from the innatist structural perspective have qualified their approaches when determining the malleability of this structure on the basis of the influence of learning and its critical periods, thus coming closer to the assumptions of Skinner. So, the dispute that emerged between these two authors in 1959 relating to language acquisition transcends the debate about whether language is learned or innate, since as MacCorquodale (1969) argues, regardless of the innatist or operant (structural or functional) perspective, language is a complex matter, full of phonemes and dynamic relations with the environment that cannot be limited to a grammatical standard, which leads us to analyse how language develops in ontogenesis, and to perform a functional analysis from the influence that it exercises on the social environment.

2. Acquisition of verbal behaviour in ontogenesis

After considering the debate about the origin of verbal behaviour, our attention now turns to functional analysis of verbal behaviour (Skinner 1981, 1986), principally considering the sensitivity to the influence of consequences on behaviour

(operant conditioning) and social reinforcement, as the principal conditioner of the verbal response. In this process the dual role that each person plays as a speaker and a listener in social reinforcement is significant. It is notable that, while behaviour after being generated or avoided by social reinforcement can occur in the absence of the listener, it is more likely to be maintained in the listener's presence owing to the reinforcement that the listener can issue. The dynamic characteristics that Skinner identified relating to verbal behaviour, as well as emphasising the role of speaker and listener, insist on both the inclusion of other languages (signs, gestures, writing) that can essentially be considered verbal because the speaker can shape the behaviour of the listener through them, and on the distinction of the operant behaviour considered and the response, prediction, or control that can be achieved in the listener's behaviour. Unlike Vygotsky (1986) and Luria (1961), Skinner does not distinguish between thought and language as for him thought is concealed verbal behaviour.

3. Verbal regulation

What role does language play in the behaviour of others and on one's own? According to Catania (2003), people's susceptibility to their behaviour being verbally regulated can be shaped by the power that words acquire in verbal behaviour. Such power depends on their function of influencing others' behaviour, both verbal and non-verbal, by means of instructions, suggestions,

descriptions, advice, indications of consequences or contingencies, laws, social values, social norms, and self-generated verbal rules.

This is how social contingencies or social consequences in verbal regulation not only involve changing the behaviour of the person who listens or speaks but also the fit of the correspondence between words and action. Contingencies that affect verbal behaviour are often different to those that prevail in non-verbal behaviour. For example, we can be celebrated socially for speaking in favour of the environment and censured if we do not do so, which maintains favourable opinions in support of the environment. However, something different happens with non-verbal behaviour relating to protecting the environment. There is often no clear response based on whether we do something in favour of the environment or stop doing it (reducing the cost of the waste collection service or imposing fines, for example). Accordingly, the consequences or contingencies for both types of behaviour, verbal and non-verbal, are different and so a discrepancy between what we say and what we do emerges.

From this perspective, educational actions, especially those relating to education about pro-environmental behaviours, have generally been oriented towards teaching values and attitudes (understood as a person's knowledge and opinions about something) with the aim of influencing the person's behaviour within a dualist perspective where values, knowledge, and attitudes are the

cause of the behaviour, its effect. Even so, results have shown that people do not always behave in accordance with their knowledge, their values, and their attitudes (Chawla & Derr, 2012). Hence, direct experience with the natural environment has been proposed as a more effective educational strategy (Collado & Corraliza, 2011), which nonetheless requires a clearer explanation of why it works.

These approaches seem insufficient when a central element in the change in behaviour is disregarded: the consequences. According to Páramo (2017), an epistemological alternative to tackling this dissonance between words and action regarding environmental education is to build a bridge between behaviour and consequences, for which the author proposes teaching rules. These, according to Ribes (2000) and Glenn (2003), are conceived as verbal descriptions that establish relations of dependency between situations where a behaviour is required, the behaviour itself, and the result it produces in the environment. The rule generally indicates by means of a verbal statement what an individual or group is expected to do in a particular situation and what would happen when doing it or not doing, even if experiencing its direct consequence is not necessary for following it, which is as a result of previous successful experiences when obeying them, or of the observation of what other do or cease to do (Gómez et al., 2006; Páramo, 2010, 2013, 2017; Baum, 2017; Kissi et al., 2017; Páramo & Burbano,

2019; Pietras, 2022; Páramo et al., in press).

Furthermore, it is surprising that people follow rules when the consequences of human actions are usually distant: there are nine months from conception to birth; the values and general rules that we learn as children at home mainly have an effect as adults. What would happen if we had to learn the traffic rules every morning, by means of trial and punishment? According to Baum (2017), even though humans preserve few memories of learning rules as children and their role in these first stages of life in their family and cultural setting is limited to listening and obeying, with the passage of time and after the age of approximately four, the effectiveness of verbal statements can be perceived, not only in following them but also in generalising them to other situations, transcending the passive figure of the listener, with the person becoming a reference, instructor, follower, and creator of rules.

In other words, a behaviour that is generally favoured by another person and that is subject to reinforcement or punishment (that is to say, that is verbally regulated) can over time easily fall into natural contingencies and finally become a behaviour that is implicitly moulded. This is the case with how we catch a ball or learn to ride a bicycle, where despite doing the action, we cannot describe in any detail why we do it one way and not another (Baum, 2017). Primary teachers often prefer not giving

rules or instructions directly but instead showing the evidence or consequences of following it and letting children make their own decisions. They even design the rules jointly with their students, as an experience that encourages them to build the rules in their words, revealing them on the basis of their consequences, and putting them into practice so that they are socially rewarded or receive direct contingencies.

How does verbal regulation act on the behaviour of the individual? While it is true that people learn to follow rules by directions from others or by imitation, it is apparent that they are also capable of verbally generating a rule based on their own experiences, something that leads to them being able to regulate their own behaviour (Peláez & Moreno, 1999). In contrast with what has been proposed from the cognitive outlook, in which reference is made to self-regulation as a characteristic or metacognitive skill of the individual to control his or her own behaviour and thoughts and plan his or her actions (De la Fuente et al. 2019), self-regulation from learning verbal rules emerges in the moment when the individual not only learns to follow rules whether through instructions, reference to other people, or observation, but also on the basis of the ones that the individual develops from prior experiences and the results of it.

So, in general rules form the principal motor of what is usually called *self-regulation*; in other words, insofar as individuals learn rules, these regulate their behaviour without direct external control necessarily mattering. This is how we move away from the approaches relating to self-regulation from the dualist perspective of Zimmerman (2008), De la Fuente (2017), and Panadero (2017). They place the cause of regulation on an internal mental level (something that gives rise to a circular or tautological definition, as the prefix *self-* involves an internal agent that regulates an individual's action) or on an instigator element external to the individual that is required for this to occur or to motivate the regulation of a given behaviour.

Instead, we consider it to be vitally important to note that human beings achieve true self-regulation through verbal regulation. The vision of rule-governed behaviour does not entail an internal effort as motivator of the action but instead positions the explanation in what direct or referred experience gives individuals to guide their behaviour. This makes speaking of self-regulation unnecessary unless it is understood to be the individual guiding its behaviour by the rules they have learnt.

4. Taxonomies of rules

With the aim of developing the exposition of pro-environmental rules for people's environmental education, the present epistemological approach first provides analyses of how rules have been classified according to their theoretical or practical purposes. As a result, the following distinction between taxonomies

of rules is established according to: how the society is organised; how the rules are expressed; their social function; the formative reference point; or the type of contingency associated with following them.

To start, rules are distinguished according to how the society has been organised: legal, social, or moral. The first type refers to regulations that are established by the authorities of a society, based on codes, constitutions, laws, and other provisions; changes in them are easy to perceive and disobeying them results in legal punishments. The second type, social norms, corresponds to social customs (culture) under which a social group generates recognition or reproach in relation to the behaviour of a person. And finally, moral rules, through which a person regulates his or her behaviour; these are conditioned by the person's beliefs of what is considered good or bad (feelings of guilt) (Bermúdez, 2021). It may however be the case that some are interlinked. Someone who cuts down a tree can incur legal sanctions because this is classified by law as an environmental offence and he must pay a fine. At the same time, he can receive a social sanction by being judged by the community, and he might also experience remorse because he has acted against his morals.

Moreover, rules are recognised according to how they are expressed: tacitly or explicitly. The first type is communicated symbolically, which means they can be learnt on the basis of the education received with regards to the symbol with which they are transmitted, and so will be followed by observation of the symbol. These are immersed in and limited by each culture by means of language, whether of courtesy or for conventions relating to the moral, the religious, the environmental, etc. For example, a sign prohibiting throwing waste into water sources. The second type are explicitly or formally expressed, which means they include a physical instigator in the environment. They are generally related to the law or to rights, and so they are embodied through police codes or codes for coexistence (Páramo, 2010). This can be illustrated by the following statement: "If you leave rubbish here, you will be punished with a fine of the minimum wage"; here the consequence is stated precisely.

Rules can also be designed and perceived according to their social function, and so they are generally aimed at coexistence and care for the environment (Páramo, 2013; Páramo et al., in press). These include ones that relate to hygiene, security, prohibition, solidarity, respect, prevention, mobility, and concern for the individual and collective health as presented in police codes or in urban signage.

The distinction between rules based on their formative reference point should also be noted. Cialdini et al. (1990) mention three types of norms (rules in our case) that can be included in this distinction. First,

descriptive norms, which are closely linked to observing what most people generally do; the importance of social influence, which makes them effective and adaptive, is recognised on the basis of them. Their principal motivation is coexistence, and they are represented by social norms and environmental beliefs. They can, for example, be perceived when most people in public places put their rubbish in the containers provided for this purpose, avoiding contamination and promoting healthy coexistence.

The second are *prescriptive* norms, of which their formative social influence on what is expected of the other stands out, that is to say, what is desirable. These are generally inspired by the feelings or beliefs of those considered correct or incorrect (that is to say, what corresponds to the moral obligation) and motivated by anticipated prizes and punishments. They can be perceived in the actions undertaken in recycling campaigns, where an instruction is given and the reason for following it is explained. For example, the statement "Dispose of plastic bottles here and avoid contaminating our planet" accompanied by a happy face or a thumbs up.

Lastly, the third are *personal prescriptive* norms, which derive from social moral judgement or (dis)approval of what is regarded as correct or incorrect. Here people judge their own behaviour according to their beliefs. So, it is natural for people to feel morally obliged to care for the environment if this starts from the beliefs with which they were educated.

Finally, and of great relevance for the purpose of the present article, rules can also be defined based on the contingency (consequences of following them) (Hayes et al., 2001; Gómez et al., 2006; Kissi et al., 2017; Páramo & Burbano, 2019; Harte et al., 2020; Pietras, 2022; Páramo et al., in press). According to these authors, the behaviour that the rule establishes is followed because of the type of contingency linked to it: social approval, the natural consequence with which the rule is linked, or the increased benefit of following it. Accordingly, there are three types of rule-governed behaviours: the first type relates to rule-following driven by social reinforcement, which has been called *pliance* (obedience / consent or compliance). Here people's actions are mediated by social recognition or criticism, or by the consequences for the speaker of following the rules. These can be found in statements such as "If you plant trees, you will receive a voucher" or "Get the certificate for the best environmental education project". Here the consequence is furnished by another person, the rule is conceived as a social regulation mechanism.

The second rule-following behaviour is associated with obeying rules because of natural or intrinsic benefit, which obeys the way in which the world is organised and has been called *tracking*. In this case, rule-following behaviour occurs because of the reinforcement of the correspondence be-

tween the rule and the natural consequences of following it. For example, assembling a table by following the instructions that come with it; following instructions to solve a mathematical problem is reinforced by the logical result that derives from following the procedure. In the same way, rule-following because of natural contingencies is apparent when saying "Disposing of waste in the right place prevents blocked drains and helps conserve water sources" and in rainy periods an improvement in prevention of the floods that generally occur is noted. Here, rule-following relates to what Peláez and Moreno (1999) call the *accuracy of a rule*, in other words, when the contingency that is obtained matches what was said would be obtained from following the rule. This correspondence is what increases the possibility of it being followed and what results in it being called an accurate rule.

And the third rule-following behaviour is associated with the reinforcement given, from the rules with increased motivational effect (Kissi et al. 2017), known as *augmenting* (behaviour shaped by changes such as prizes and punishments) artificially augmented. Here the value of the reinforcer in the previous two types is augmented from motivative augments and formative augments. The first type refers to rules that have an effect both on the value of stimuli and on the alteration of behaviour. This is how the possibility of following a certain behaviour is increased or reduced from

the rule by magnifying the consequence of this, for example, "Don't use your vehicle, you are burning our planet". Meanwhile, from the second type, new reinforcers or punishments emerge; although these are less common than the previous ones, they have a notable role in the control of behaviour regulated by rules. This can be illustrated by the following advertising slogans: "Our rivers are not your waste heap, prison await you" or "Redeem your voucher, recycling pays well".

As Bermúdez (2021) notes, laws, which are nothing more than verbal rules, undoubtedly become the principal mechanism for regulation of a society. This is of course without ignoring the criticism that derives from the totalitarianism from which legal norms sometimes arise and following them when people move away from their principles and submit themselves to the power exercised by different systems (religious, political, etc.), prioritising obedience and authoritarianism, or ideology. This makes visible the existing imbalance between norms, sometimes emphasising the social and excluding the moral, or emphasising the moral aspect but leaving aside the legal, which can be seen in everyday matters of societies as it is a behaviour that is socially punished but even so, is not susceptible to a legal sanction. Social and moral rules can strengthen or challenge what is established from the legal sphere. This variability or contradiction between laws can in some way contribute to pliance with them and their effectiveness, both

in the individual sphere and in group behaviours, something that will be addressed in the following section.

5. (In)sensitivity to following rules: how can this be tackled?

Having considered the origins of verbal behaviour, its influence on human behaviour, and the way attempts are made through verbal regulation to educate and change people's behaviour by enunciating verbal rules, we now come to the question of why despite the benefits of rule-following, whether to achieve outcomes that favour people or prevent undesirable situations for them, some people do not follow them; in other words, are insensitive to learning them, something called *insensitivity to rule following* (Kissi et al., 2017). "This insensitivity refers to the relative absence of control through consequences, because the behaviour is assumed to be sensitive to the contingencies that shaped the rule-following behaviour" (Cerutti, 1989, p. 260); or, according to Gómez et al. (2006), "to the lack of fit to the direct contingencies, as the behaviour would be under the control of words and would be sensitive to these" (p. 59).

Skinner (1981, 1986) considers this aspect from two perspectives. He contemplates verbal behaviour as a dependent variable, where, on the one hand, some verbal stimuli (which, according to his theory, would be seen as discriminative stimuli3) could be inadequate, unclear, or poorly presented or, on the other hand, could present an absence of reinforcement or be delayed. Although the behaviour can

be maintained despite the absence of a direct or social reinforcement, over time this tends to weaken and even disappear, as the author states.

A more in-depth examination of these possible situations is presented below in which (in)sensitivity to contingencies can be displayed from in two categories, according to Luciano (as cited in Gómez et al., 2006):

1. *Discrimination between contingencies and what is described in the rule*, a category that entails confusion between what the contingency establishes and what the rule says.

2. *Competition between direct consequences of doing something and the social consequences of rule following*, a category that entails a difference between the contingencies of personal benefit received.

Enrichment of this perspective is pursued, adding new considerations to these categories and incorporating some aspects identified by authors such as Peláez and Moreno (1999), Gifford (2011), Bermúdez (2021), Pinker (2021), and Pietras (2022), in turn proposing educational options for resolving it.

On the one hand, the first category *(discrimination between contingencies and what is described in the rule)* groups factors such as:

a) Variability / inconsistency between the rule and its consequence: this can, for

example, be seen in intergenerational change, when older people expect young people to act how they did, even when the contingencies are no longer the same. So, it becomes necessary to make changes to contingencies for new generations for behaviours that do not fit the rules.

b) Ambiguous content of the rule: the rule is not clear, there is a discrepancy between what is established verbally and the consequences that occur. To resolve this, making explicit the relationship between the situation, the expected behaviour, and the consequence is proposed.

c) Desensitisation: while a direct relationship is perceived between the flexibility or the rigour of the rule and the disorder or self-control that defines societies, this will be unable to become the fundamental factor for arguing how people should behave. The contingency for following the rule loses value if there is overexposure to it, and so it is necessary to replace the sanctions for not following the rules with social recognition and offer benefits of obeying them.

d) Personal history: some people / students are more sensitive to rule following if they experience the contingency, some are more sensitive to observing experience of the contingency, and others are more sensitive to the instruction given in order to receive the contingency. Therefore, a type of rule can function for some individuals

but not for others. From this perspective, variability in people's behaviour should be generated before changing the contingency.

e) Immediate or delayed consequences after verbalising the rule: immediacy in receiving the consequence is a determining factor in the sensitivity to following rules. This can, for example, be evinced in relation to the implications of climate change, which might be experienced in the very long term, resulting in a low likelihood of the rule being followed, in contrast with what happens when the consequence is immediate, which guarantees the rule will be followed. One way of approaching this situation might be to increase the value of the signs that announce benefits or positive or negative consequences by making the consequence closer in time based on signs that announce its closeness. For example, in the case of climate change, showing the effects of floods or extreme droughts.

f) Consequences of execution of the rule: this aspect is related to the reinforcement or punishment value of the contingency. In some cases, the contingency does not exist or is poor, which results in the rule not being followed. It can also be perceived through doubt or lack of certainty in relation to the efficacy of the actions undertaken in relation to climate change. So, the question of how effective/true (possible) the contingency arises, which is called the *degree of fit between the*

rules and the contingencies. This aspect relates to the likelihood of receiving the contingency. Promoting behaviour change by making people see that following rules effectively produces consequences, whether positive or negative, is proposed. It then becomes necessary to ensure that the consequences are received and that their value is sufficiently valuable or punitive for the individual.

g) Lack of experience of following rules: for people to be more sensitive, teaching rules and following them from an early age is proposed in different educational scenarios: the home or the school.

h) Lack of dissemination of laws or ignorance of the problems from which they emerge: one factor that has a major impact on pliance with rules is knowledge of them or recognition of their impact in the face of a current problem; not knowing of their existence means society is less likely to comply with them. To counteract the shortcoming, expanding the channels of communication is proposed, thus guaranteeing cover of the different social actors.

i) Differences in culture or rule-following traditions: the rule is decontextualised or goes against the culture. One way to approach this dissonance is to take into account the moral beliefs of the society when designing of rules, which will without any doubt facilitate their fulfilment.

j) Irrationality in the face of the systematic (the rules of reason and science): there is no appetite for or interest in what involves bias. One possible approach is to promote rationality from early childhood by designing rules that fit logic and scientific evidence. Agreeing on rules that realign incentives towards the truth. Valuing the norm of rationality itself/approval or disapproval of rational or irrational habits.

k) Contradictory norms: distortion or lack of scientific, journalistic, or political consensus reduces belief in certain factors. For this, the proposal is to disseminate messages of consensus, which are a method for overcoming the debilitating effect. This factor can also be perceived in contradiction between the same norms, in other words, social, legal, and moral norms contradicting one another. Here it is necessary to work against obedience and shape individuals' critical thinking so that they can determine priorities and decide what is relevant when facing the paradoxes that are presented within the rules.

l) The contingency for following the rule is artificial: this aspect alludes to a lack of correspondence between following a rule and receiving a natural contingency or one that is inherent to how society is organised. If an individual gets a hamburger as an incentive for reducing electricity use, the difficulty of establishing a logical and natural connection between pliance with the

rule and the contingencies of doing so is clear. For this reason, the importance of establishing a coherent relationship between the rule and the contingency is identified.

m) Lack of credibility of the source from which the rule or norm emerges: Although there is no correspondence with the contingencies from following the rule or they are unknown, people are more inclined to follow a rule the more social recognition for following it is perceived or if there is a generalised favourable image of the situation that the rule imposes, which ensures that the behaviours weaken people's rationality, maintaining the assumption that social acceptance and fear of exclusion for not complying them have more weight.

On the other hand, the second category *(competition between the direct consequences of doing something and the social consequences of rule-following)* includes factors such as:

a) Competition between individual and collective benefit: in this situation, rule following is conditional on the duality between rule following because an immediate individual benefit is received, or because the contingencies will result in long-term collective benefits. In general, it is the common good that prevails favouring the community in general, and so it is necessary to maintain and drive this spirit of cooperation in societies.

b) Motivational tendencies of the subject according to his or her history: when there is a propensity towards social or direct contingencies, as there is an absence of regulation by an authority figure, the possibility of rules being followed reduces. Nonetheless, it must be taken into account that coercive figures or conscious learning processes are not required; it is enough to show what others do in conversations, in advertising, in what is broadcast in the media: something called a *social norm of fulfilment*.

c) Social comparison: people are generally insensitive to rule-following based on perceiving the difficulty of achieving collective behavioural regulation. They deduce that acting individually is ineffective, so they delegate the need to follow rules to other individuals. In consequence, contingencies must be created that promote not only collective actions but also recognitions that extol the importance of individual contributions.

d) Discrepancy in the following of rules between the people who design them or must ensure they are obeyed and those who must follow them (impunity: "don't you know who I am"): this perceived inequality in the consequences of following rules in relation to the consequences for others when following the rule hinders following them. It must be taken into account that what ensures rules are followed is not just the possibility of

being sanctioned but the knowledge that this is considered to be a way of acting shared by other people. If we look and see other people following rules, we will follow them, but if what is observed or divulged is that other people do not follow the rules or that the people who should ensure they are followed break them, then they will not be complied with.

e) The effort involved in rule following: this leads to cumbersome procedures or hinders appropriate following by the people who should ensure they are followed, making it more likely that they will not be followed. This makes necessary to work on better design of rules [a little push (Thaler & Sustein, 2008)] to facilitate following them.

f) Social reproach: although this factor increases the likelihood of people abiding by rules, sometimes, in contrast to what is expected, people are not judged for not following the rule but are condemned socially for following them. Social sanctions are more effective than legal sanctions or individual incentives, and so people must be educated in a culture of recognising following rules as being worth the effort (through incentives) and that disobeying them leads to real sanctions, both legal and social (fines / rejection).

g) Moral compensation: justifying bad actions to avoid taking on behaviours that require greater effort.

This can be illustrated, for example, when people decide to recycle bottles instead of reducing or eradicating consumption of bottled water, thus morally compensating for their behaviour through this small action. In this case it becomes necessary to educate society to be more morally and socially disciplined to generate true regulation.

h) Conflicts between following rules that involve simultaneous behaviours, before the simultaneous action of rules to follow: here following the rule is subject to the greatest aversive consequence or the most positive one. In relation to this, teaching people to evaluate the consequences between rules that come into conflict based on the size of the benefit or sanction received is proposed. Similarly, the importance of establishing some kind of dilemma (moral, social, or legal) for the individual when designing rules is highlighted as this reduces the chance of it being disobeyed.

6. The role of rules in the design of macro- and meta-contingencies for environmental education, mitigating climate change and adapting to it

When educating large population groups about shared problems as in the case of climate change, contingencies must be designed in such a way that they are directed at groups of individuals for which pro-environmental rules must

serve as a bridge in the design of macro-contingencies (MC) and meta-contingencies (MT).

According to Glenn (1988), the former are defined as the agreement between social practices and the results that maintain them; that is to say, the accumulated action of multiple behaviours that produces benefits/harms for all individuals. In this way, "a macro-contingency is established when a functional relationship is created between a social practice that a group of people shares and the result of this collective action as the summation of individual behaviours" (Páramo et al., in press). One example of this could be when people reduce unnecessary use of paper, which, as well as generating social approval for each of the individuals involved in this action, is reflected in the conservation of forests, thus ensuring the cleanliness of the air and the regulation of the climate, benefiting all of society.

The second type, meta-contingencies, are defined as the compromise between individual *interlinked* practices and the accumulated results that maintain them, producing greater benefit for the group than is obtained by individual actions (Glenn, 1991, 2004; Glenn et al., 2016). For example, when a work team whose members know one another directs its efforts to conserving a public park (some taking care of cleaning it, others taking charge of its surveillance, and others still of the conservation of the animals that live in it and the monuments that adorn it), each of these individual contributions will produce a cumulative

effect that benefits both the individual and the group in general. The relationship between the many interdependent behaviours and their consequences leads to a meta-contingency that results in the selection of a group of behaviours or cultural practices and their consequences that the environment provides, guiding people's behaviour and guaranteeing its upkeep by means of cultural transmission of these practices. Weather warnings might be ineffective in the context of metacontingencies that favour practices that are at odds with climate action (Pietras, 2022). In other words, individuals will cooperate with one another when their interdependent behaviour produces greater favourable consequences than independent behaviour (Glenn, 1991, 2003; Glenn et al., 2016).

Accordingly, the rule is the verbal mechanism that establishes relationships of contingency in macro-contingencies and meta-contingencies.

7. Conclusions

This article identifies the importance of directing environmental education towards teaching pro-environmental rules. This approach is based on an epistemological and theoretical position centred on the acquisition and maintenance of language owing to its consequences in a functional analysis that differs from innatism but recognises the continuum between biology and culture.

In recent years, the accumulated evidence has led language theorists to

accept the interaction between the evolutionary process that resulted in the biological structure of the phonological apparatus and the possibility of exercising operant control of it and the functional relationship of language with the social context. As a result, it is accepted that language emerges from the interaction of three different adaptive systems: biological evolution, individual learning, and cultural transmission. This suggests that biological adaptation and cultural transmission have both interacted in the evolution and acquisition of language. Consequently, there is a need to redefine the category of learning, now incorporating the biological antecedents that influence what is learned and the speed with which this process takes place. We conclude that Chomsky's and Skinner's positions are both partially true and complement one another, and so it is clear that the theory of learning must be readjusted to include the biological and environmental aspects of language acquisition, within a concept such as open instinct.

Moreover, it is not necessary to regard learning as a cognitive process, but rather as a complex interaction between our biology, our surroundings, and the relationship that is established between language and people's social verbal setting. One of the conceptual contributions in the article that should be highlighted is that verbal regulation is the cornerstone of what is conceived of as self-regulation, and distances itself from the established outlooks from the cognitive position.

In this way, education in pro-environmental rules becomes the pedagogical device that provides more effective environmental benefits by establishing precisely what is expected for the scope of the desired goals, anticipating by means of various communication and education strategies the insensitivities that usually emerge for following them. It also does this by establishing the macro- and meta-contingencies that tend towards both individual and collective benefit when safeguarding the planet.

Finally, it is important to underline that, other than those that are legal in nature, verbal rules are a guide for action. So, education in pro-environmental rules should not be seen as a mandatory condition or condition of control for the person; they provide guidance of the benefits that would be obtained at both an individual and a collective level when protecting the environment.

Notes

[1] The author participated in this article as part of her studies in the Inter-Institutional Doctoral Program in Education at the Universidad Pedagógica Nacional, Colombia.

[2] Unlike in ordinary language, where the term *contingency* refers to 'uncertainty regarding something', this article uses the definition from behavioral psychology. In this context, contingency is understood as a relationship of dependency between a consequence (whether positive or negative) and a behavior. For example, the benefit will be received whenever the expected behavior occurs.

[3] For enthusiasts, see the critique that Ribes (2000) makes of the inadequate definition of *rule* as a 'discriminative stimulus'.

Authors' contributions

Leidy-Vanessa Díaz-Beltrán: Investigation; Writing (Original Draft Preparation); Visualisation.

Pablo Páramo: Conceptualisation; Supervision; Writing (review and editing); Visualisation.

References

Alcock, J. (2003). *The triumph of sociobiology*. Oxford.

Álvarez-González, C. J. (2010). La relación entre lenguaje y pensamiento de Vigotsky en el desarrollo de la psicolingüística moderna [Thinking and language in Vigotsky and the presence of his theory in the modern psycholinguistics]. *RLA, Revista de Lingüística Teórica y Aplicada*, *48* (2), 13-32. https://dx.doi.org/10.4067/S0718-48832010000200002

Bandura, A., & Walters, R. H. (1959). *Adolescent aggression: A study of the influence of child-training practices and family interrelationships*. Ronald.

Baum, W. M. (2017). *Understanding behaviorism: Behavior, culture, and evolution*. John Wiley & Sons.

Bermúdez, J. (2021). *¿Por qué incumplimos la ley? Carta a un joven estudiante [Why do we break the law? Letter to a young student]*. Ariel.

Broadbent, D. E. (1958). The selective nature of learning [El carácter selectivo del aprendizaje]. In D. E. Broadbent, *Perception and communication [Percepción y comunicación]* (pp. 244-267). Pergamon Press.

Catania, A. C. (2003). Verbal governance, verbal shaping, and attention to verbal stimuli. In K. A. Lattal, y P. N. Chase (Eds.), *Behavior theory and philosophy* (pp. 301-321). Springer US.

Cerutti, D. T. (1989). Discrimination theory of rule-governed behavior. *Journal of the experimental analysis of behavior*, *51* (2), 259-276.

Chawla, L., & Derr, V. (2012). The development of conservation behaviors in childhood and youth. In Susan D. Clayton (Ed.), *The Oxford handbook of environmental and conservation psychology* (pp. 527-555). Oxford University Press.

Chomsky, N. (1959). A review of B. F. Skinner's *Verbal behavior*. *Language*, *35* (1), 26-58.

Cialdini, R. B., Reno, R. R., & Kallgren, C. A. (1990). A focus theory of normative conduct: Recycling the concept of norms to reduce littering in public places. *Journal of Personality and Social Psychology*, *58* (6), 1015-1026.

Corraliza, J. A., & Collado, S. (2011). La naturaleza cercana como moderadora del estrés infantil [Close nature as a moderator of childhood stress]. *Psicothema*, *23* (2), 221-226.

De la Fuente, J. (2017). Theory of self- vs. externally-regulated learning™: Fundamentals, evidence, and applicability. *Frontiers in Psychology, 8*, 1675.

De la Fuente, J., González-Torres, M. C., Aznárez-Sanado, M., Martínez-Vicente, J. M., Peralta-Sánchez, F. J., & Vera, M. M. (2019). Implications of unconnected micro, molecular, and molar level research in psychology: The case of executive functions, self-regulation, and external regulation. *Frontiers in Psychology*, *10*, 1919.

Gifford, R. (2011). The dragons of inaction: psychological barriers that limit climate change mitigation and adaptation. *American Psychologist*, *66* (4), 290-302.

Glenn, S. S. (1988). Contingencies and metacontingencies: Toward a synthesis of behavior analysis and cultural materialism. *The Behavior Analyst*, *11* (2), 161-179.

Glenn, S. S. (1991). Contingencies and metacontingencies: Relations among behavioral, cultural, and biological evolution. In P. A. Lamal (Ed.), *Behavioral analysis of societies and cultural practices* (pp. 39–73). Hemisphere Publishing Corp.

Glenn, S. S. (2003). Selección en dos niveles en la evolución de la ciencia [Two-level selection in the evolution of science]. *Revista Latinoamericana de Psicología*, *35* (3), 281-288.

Glenn, S. S. (2004). Individual behavior, culture, and social change. *The Behavior Analyst*, *27* (2), 133-151.

Glenn, S. S., Malott, M. E., Andery, M. A. P. A., Benvenuti, M., Houmanfar, R. A., Sandaker, I., Todorov, J. C., Tourinho, E. Z., & Vasconcelos, L. A. (2016). Toward consistent terminology in a behaviorist approach to cultural analysis. *Behavior and Social Issues, 25* (1), 11-27.

Gómez, I., Moreno, E., & López, N. (2006). *Sensibilidad a unas u otras contingencias en el marco de la conducta gobernada por regla*s *[Sensitivity to one or the other contingencies in the framework of rule-governed conduct].* Plaza y Valdés.

GramaPsico. (2023, 3 de mayo) *LANGUAGE and VERBAL BEHAVIOR II ~ NOAM CHOMSKY and CHARLES CATANIA #110* [Video]. YouTube. https://www.youtube.com/watch?v=9bwLMXob-AI&t=2299s&ab_channel=enGramaPsico%CE%A8

Gutiérrez, G. (2005). I. P. Pavlov: 100 años de investigación del aprendizaje asociativo [I. P. Pavlov: 100 years of associative learning research]. *Universitas Psychologica*, *4* (2), 251-255.

Harte, C., Barnes-Holmes, D., Barnes-Holmes, Y., & Kissi, A. (2020). The study of rule-governed behavior and derived stimulus relations: Bridging the gap. *Perspectives on Behavior Science*, *43* (2), 361-385.

Hayes, S. C., Barnes-Holmes, D., & Roche, B. (Eds.). (2001). *Relational frame theory: A post-Skinnerian account of human language and cognition*. Springer Science & Business Media.

Kissi, A., Hughes, S., Mertens, G., Barnes-Holmes, D., De Houwer, J., & Crombez, G. (2017). A systematic review of pliance, tracking, and augmenting. *Behavior modification*, *41* (5), 683-707.

Lieberman, P. (1998). *Eve spoke: Human language and human evolution*. WW Norton.

Luria, A. R. (1961). *The role of speech in the regulation of normal and abnormal behavior*. Liveright.

MacCorquodale, K. (1969). B. F. Skinner's *Verbal behavior*: A retrospective appreciation. *Journal of the experimental analysis of behavior*, *12* (5), 831-841.

Marler, P., & Terrace, H. S. (Eds.) (1984). *The biology of learning: Report of the Dahlem Workshop on the Biology of Learning, Berlin 1983, October 23-28*. Springer-Verlag.

Midgley, M. (1978). *Beast and man: The roots of human nature*. Cornell University Press.

Neisser, U. (1967). *Cognitive psychology*. Appleton-Century-Crofts.

Panadero, E. (2017). A review of self-regulated learning: Six models and four directions for research. *Frontiers in Psychology*, *8*, 422. https://doi.org/10.3389/fpsyg.2017.00422

Páramo, P. (2010). Aprendizaje situado: creación y modificación de prácticas sociales en el espacio público urbano [Situated learning: Creation and modification of social practices in urban public space]. *Psicologia & Sociedade*, *22* (1), 130-138.

Páramo, P. (2013). Comportamiento urbano responsable: las reglas de convivencia en el espacio público [Responsible urban behavior: Rules of conviviality in public space]. *Revista Latinoamericana de Psicología*, *45* (3), 473-485. http://dx.doi.org/10.14349/rlp.v45i3.1488

Páramo, P. (2017). Reglas proambientales: una alternativa para disminuir la brecha entre el decir-hacer en la educación ambiental [Pro-environmental rules: An alternative for reducing the "say-do" gap in environmental education]. *Suma psicológica*, *24* (1), 42-58. https://doi.org/10.1016/j.sumpsi.2016.11.001

Páramo, P., & Burbano, A. (2019). Gramática espacial urbana: la orientación espacial guiada por reglas verbales [Spatial and urban grammar: Spatial orientation focuses on verbal rules]. *Psicogente*, *22* (41), 308-332. https://doi.org/10.17081/psico.22.41.3313

Páramo, P., Burbano, A., Ojeda, G., & Angulo, E. (In press). La señalética urbana orientada a la convivencia [Coexistence-oriented urban signage]. *Revista de Arquitectura (Bogotá)*.

Peláez, M., & Moreno, R. (1999). Four dimensions of rules and their correspondence to rule-governed behavior: A taxonomy. *Behavioral Development Bulletin*, *8* (1), 21-27.

Piaget, J. (1978). *La equilibración de las estructuras cognitivas, problema central del desarrollo [Balancing cognitive structures, a central developmental issue]*. Siglo XXI.

Pietras, C. J. (2022). Rule-governed behavior and climate change: Why climate warnings fail to motivate sufficient action. *Behavior and Social Issues*, *31* (1), 373-417. https://doi.org/10.1007/s42822-022-00109-y

Pinker, S (2007). *The language instinct*: *How the mind creates language*. Harper Perennial Modern Classics.

Pinker, S (2021). *Racionalidad: qué es, por qué escasea y cómo promoverla [Rationality: What it is, why it is scarce and how to promote it]*. Paidós.

Ribes, E. (2000). Instructions, rules, and abstraction: A misconstrued relation. *Behavior and philosophy*, *28* (1-2), 41-55.

Sauter, D. A., Eisner, F., Ekman, P., & Scott, S. K. (2010). Cross-cultural recognition of basic emotions through nonverbal emotional vocalizations. *Proceedings of the National Academy of Sciences*, *107* (6), 2408-2412. https://doi.org/10.1073/pnas.0908239106

Seligman, M. E., & Hager, J. L. (1972). *Biological boundaries of learning*. Appleton Century Crofts.

Skinner, B. F. (1938). *The behavior of organisms: An experimental analysis*. B. F. Skinner Foundation.

Skinner, B. F. (1953). *Science and human behavior*. The Free Press.

Skinner, B. F. (1986). The evolution of verbal behavior. *Journal of the Experimental Analysis of Behavior, 45*, 115-122. https://doi.org/10.1901/jeab.1986.45-115

Skinner, B. F. (Ed.) (1981). *Conducta verbal [Verbal behaviour]*. Editorial Trillas.

Thaler, R., & Sunstein, C. (2008). *Nudge: Improving decisions about health, wealth, and happiness*. Penguin Books.

Tomasello, M. (2016). *A natural history of human morality*. Harvard University Press.

Vygotsky, L. S. (1986). *Thought and language*. MIT Press.

Wilson, E. O. (2012). *La conquista social de la Tierra [The social conquest of the Earth]*. Debate.

Wilson, E.O. (2000). *Sociobiology: The new synthesis*. Harvard University Press

Zimmerman, B. J. (2008). Investigating self-regulation and motivation: Historical background, methodological developments, and future prospects. *American educational research journal*, *45* (1), 166-183.

Authors' biographies

Leidy-Vanessa Díaz-Beltrán. Inter-institutional doctoral student in Education at the Universidad Pedagógica Nacional. Licentiate degree in Humanities and Languages from the Universidad Libre, master's in Education specialising in English Teaching from the Universidad Externado, Colombia. Her interest in environmental education has led to her obtaining collective awards such as the BIBO 2014 prize with the Escuela Pedagógica Experimental. She currently works as a teacher in the Secretariat of Education, Bogotá (Colombia).

https://orcid.org/0009-0004-7731-2077

Pablo Páramo. He earned his PhD in Psychology from City University of New York (CUNY) as a Fulbright scholar and his Master of Science degree from the University of Surrey (England) as a British Council scholar. He obtained his undergraduate degree in Psychology from the Universidad Católica de Colombia. He was recently honoured with the Augusto Angel Maya Award for his contributions to Colombian environmental

thought and has been recognised as an Emeritus Researcher by the Ministry of Science of Colombia. He is currently a faculty member in the Doctorate in Education programme at the Universidad Pedagógica Nacional de Colombia.

https://orcid.org/0000-0002-4551-3040