Decoding Validity: Embodied Cognition in Shaping Concepts about Objectivity, Subjectivity, and Institutional Dynamics

Decodificando la validez: cognición corporeizada en la formación de conceptos sobre objetividad, subjetividad e institucionalidad

Décoder la validité : la cognition incorporée dans l'élaboration de concepts sur l'objectivité, la subjectivité et la dynamique institutionnelle

Decodificar a validade: cognição incorporada na formação de conceitos sobre objetividade, subjetividade e dinâmica institucional

Jonathan Restrepo-Rodas
Assistant Professor, Universidad del Valle, Cali, Colombia.
restrepo.jonathan@correounivalle.edu.co
https://orcid.org/0000-0001-6543-1774

Laura Niño-Buitrago
Doctoral student, Universidad Autónoma de Manizales, Manizales, Colombia.
laurae.ninob@autonoma.edu.co
https://orcid.org/0000-0001-9165-500X

Mercedes Suárez de la Torre
Full Professor, Universidad Autónoma de Manizales, Manizales, Colombia.
mercedessuarez@autonoma.edu.co
https://orcid.org/0000-0002-1223-2146

Abstract

The notion of validity has been largely questioned in diverse research domains. While it has a long tradition in philosophy and logics, cognitive linguists are approaching new ways of understanding why it is possible to form representations in the mind that are framed in validity values, a cognitive aspect that is intertwined in the construction of concepts and reasoning. Ultimately, this impacts what humans validate and invalidate, accept as true or judge as false, and consider moral and immoral. The present article provides an approximation to a specific linguistic and cognitive process that is apparently in charge of validating and invalidating the concepts individuals create in the mind, with the aid of their socio-physical experience. Following an ethnomethodological research design, this article shows the compilation and analysis of participants' ideas about harming or protecting the environment. The findings suggest that the embodied experience individuals create, particularly in terms of geometry, mathematics, and physics, plays a crucial role in validating and invalidating mental representations. This study sheds light on the intricate connections between socio-physical experiences and the construction of concepts, by providing valuable insights into the mechanisms underlying human cognition from language production.

Keywords: objectivity, subjectivity, institutions, embodiment, physics, image schemas

Resumen

La noción de validez ha sido ampliamente cuestionada en diferentes campos de investigación. Aunque tiene una larga tradición en la filosofía y la lógica, los lingüistas cognitivos están abordando nuevas formas de comprender por qué es

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Íkala, Revista de Lenguaje y Cultura
Medellín, Colombia, Vol. 30 Issue 2 (May-August, 2025), pp. 1-25, ISSN 0123-3432
www.udea.edu.co/ikala

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posible formarse representaciones mentales enmarcadas en valores de validez, un aspecto cognitivo que se imbrica en la formación de conceptos y en el razonamiento. En últimas, esto impacta la manera como los humanos validan o invalidan, aceptan como verdadero o falso y lo que consideran moral o inmoral. Este artículo ofrece una aproximación a un proceso lingüístico y cognitivo específico que al parecer se encarga de validar o invalidar los conceptos que las personas crean en su mente con ayuda de su experiencia sociofísica. Siguiendo un diseño de investigación etnometodológico, este artículo presenta la compilación y el análisis de las ideas de los participantes sobre dañar o cuidar el medio ambiente. Los hallazgos indican que la experiencia corporeizada que las personas crean, especialmente en términos de geometría, matemáticas y física, tiene un rol crucial en la validación o invalidación de las representaciones mentales. El artículo arroja luz sobre las intrincadas conexiones entre las experiencias sociofísicas y la construcción de conceptos, ofreciendo perspectivas valiosas sobre los mecanismos que subyacen la cognición humana desde la produccion lingüística.

Palabras clave: objetividad, subjetividad, instituciones, corporeización, física, esquemas de imágenes

Résumé

La notion de validité a été largement remise en question dans divers domaines de recherche. Bien qu'elle ait une longue tradition en philosophie et en logique, les linguistes cognitifs abordent de nouvelles façons de comprendre pourquoi il est possible de former des représentations dans l'esprit qui sont encadrées par des valeurs de validité, un aspect cognitif qui est entrelacé dans la construction de concepts et de raisonnements. En fin de compte, cela a un impact sur ce que les humains valident et invalident, acceptent comme vrai ou jugent comme faux, et considèrent comme moral et immoral. Le présent article propose une approximation d'un processus linguistique et cognitif spécifique qui est apparemment chargé de valider et d'invalider les concepts que les individus créent dans leur esprit, à l'aide de leur expérience socio-physique. En suivant un modèle de recherche ethnométhodologique, cet article montre la compilation et l'analyse des idées des participants sur l'atteinte ou la protection de l'environnement. Les résultats suggèrent que l'expérience incarnée que les individus créent, en particulier en termes de géométrie, de mathématiques et de physique, joue un rôle crucial dans la validation et l'invalidation des représentations mentales. Cette étude met en lumière les liens complexes entre les expériences socio-physiques et la construction de concepts, en fournissant des informations précieuses sur les mécanismes qui sous-tendent la cognition humaine à partir de la production de langage.

Mots clés : objectivité, subjectivité, institutions, incorporation, physique, schémas des images

Resumo

A noção de validade tem sido amplamente questionada em diversos domínios de pesquisa. Embora tenha uma longa tradição em filosofia e lógica, os linguistas cognitivos estão abordando novas maneiras de entender por que é possível formar representações na mente que são enquadradas em valores de validade, um aspecto cognitivo que está entrelaçado na construção de conceitos e raciocínio. Em última análise, isso afeta o que os seres humanos validam e invalidam,

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aceitam como verdadeiro ou julgam como falso, e consideram moral e imoral. O presente artigo fornece uma aproximação a um processo linguístico e cognitivo específico que aparentemente é responsável por validar e invalidar os conceitos que os indivíduos criam na mente, com a ajuda de sua experiência sociofísica. Seguindo um projeto de pesquisa etnometodológica, este artigo mostra a compilação e a análise das ideias dos participantes sobre como prejudicar ou proteger o meio ambiente. Os resultados sugerem que a experiência incorporada que os indivíduos criam, especialmente em termos de geometria, matemática e física, desempenha um papel fundamental na validação e invalidação de representações mentais. Este estudo lança luz sobre as intrincadas conexões entre as experiências sociofísicas e a construção de conceitos, fornecendo percepções valiosas sobre os mecanismos subjacentes à cognição humana a partir da produção de linguagem.

Palavras chave: objetividade, subjetividade, instituições, incorporação, física, esquemas de imagens

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Introduction

Recent times have seen the growth of interest about modality in the field of cognitive linguistics. This interest turned it into a fundamental subject in diverse handbooks, such as the *Oxford Handbook of Cognitive Linguistics* (Geeraerts & Cuykens, 2007). In relation to other cognitive domains where language plays a role, such as metaphors and metonymy, modality has been less studied. This may be due to the ambiguous conceptualization of modality. Some research reports place it within cognitive grammar, while other sources consider it a part of cognitive semantics. In either case, it shapes meaning in an ulterior stage, implying that it is necessary for the consolidation of thought and communication. This study supports the belief that modality is a theme in cognitive semantics, indicating its interaction with cognitive processes stemming from sociophysical experience (Evans & Green, 2006).

Two main traditions have developed accounts of modality. In fact, while the Anglo-Saxon tradition conceives it as "an attitude towards the proposition" (Givón, 1994, p. 266), the Latin-Greek tradition takes it as the "validation and invalidation of mental representations" (Gosselin, 2010, p. 50). The endeavor to explain how modality works has led the former tradition to focus on modal-like markers (e.g., may, should, might), whereas the latter has explored further elements in the propositions; in fact, any part of speech and their union at the level of predications. A predication is understood as the relation of a subject with its arguments, expressing what is said about the subject (Gosselin, 2010). In that sense, modality operates in the faculty of judgment to articulate validation, as opposed to logical validity, so that mental representations[1] can be construed and then uttered in forms of predications, sentences,

propositions, to name a few. However, to understand what is meant by the term 'validation', it is required to take a glance at the most important parameter that allows modality to occur: the instance of validation.

To understand what it is and how it works, just imagine that if the mental representations (e.g., concepts) that humans create upon experience did not have the taste of validity criteria, no one could therefore say that a concept is valid, true, false, moral, desirable, subjective, or volitive. Arguably, no concept could gain any stability whatsoever. This is what the instance of validation is all about; it condenses every possibility that can frame any concept, thus impacting any utterance, any predication, etc. The three poles are objectivity, subjectivity, and institutionalization. In this sense, all concepts are grounded in either one of the poles, somewhere in a mental space (Fauconnier & Turner, 2002; Gärdenfors, 2000, 2004, 2014; Gosselin, 2010). In this mental space, the rise of modalities is optimal, providing six specific categories of modalities: alethic, epistemic, deontic, volitive, appreciative, and axiological (Gosselin, 2010, 2018).

As for the concepts, they are all bound, at the very least, to a modal category and a modal value (or degree). Consequently, dealing with objective matters involves an alethic modality ('There are trees'), addressing subjective reality incorporates an epistemic modality ('Those trees are big'), handling volitive matters entails a volitive modality ('I want to plant a tree'), adopting a deontological stance encompasses a deontic modality ('I am allowed to plan a tree'), and so forth (Restrepo-Rodas, 2024). As language is the reflex of thought (Talmy, 2007), these kinds of modalities are a reflex of the instances of validation that shape them in the suggested mental space. In practical terms, this parameter is believed to be based on a qualitative relation of two axes: the variation of objectivity, intersubjectivity and subjectivity among individuals (axis h), and the variation of

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1   In this study, mental representations encompass a broad spectrum, from beliefs to concepts, to mental states, desires, beliefs and attitudes (Gosselin, 2010; Laitinen, 2014).

Figure 1 The Instance of Validation Parameter in Gosselin's (2010) Theory of Modalities
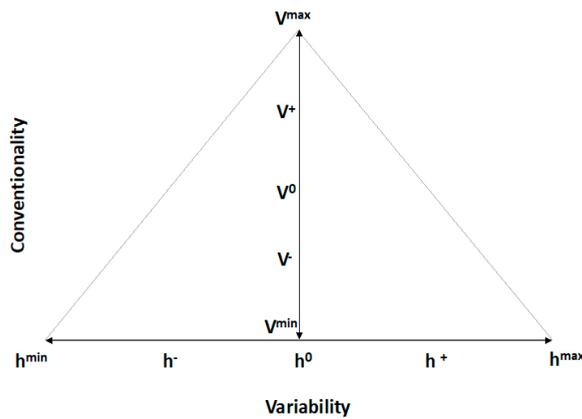
Source: Gosselin (2010, p. 257)

conventionality (axis v). Both axes are represented in forms of continuums, ranging from a minimum to a maximum degree, with three degrees in between for each axis (see Figure 1).

With the aid of the resulting gradations, Gosselin (2010) obtained a mechanism to locate specific coordinates in the triangular mental space resulting from the interaction of axes X (h) and Y (v). By definition, if a concept is open to a maximum variability (h^{max}), then it represents a very subjective stance. The opposite is also true, the minimum degree of variation (h^{min}) manifests an objective standpoint. The rest of the coordinates in axis h represent values in between (intersubjectivity). It is worth noting that intersubjectivity is here understood from the lenses of cognitive semantics, owing this categorization to the fact that it interacts with objectivity and subjectivity in the vector h. Other linguistic and pragmatic uses of intersubjectivity do not fit the semantic criteria to be covered in this framework (e.g., Brems, 2021).

Regarding axis v, the maximum degree of conventionality indicates a high degree of agreement among individuals, while the minimum degree represents a non-conventional stance. The resulting coordinates demarcate the areas in which a specific concept is validated or invalidated, based on its instance of validation. For instance, objectivity is located in the area marked by coordinates (h^{min},h^0), while subjectivity represents the area (h^0,h^{max}), and institutions occupy the portion (v^0,v^{max}). Evidently, the interaction of conventionality (v) and the number of individuals (h) indicates an important area of intersubjectivity, which Gosselin (2010, p. 255) largely marked as (] h^-, h^+ [), assuming that axis v's nature is entirely intersubjective while axis h only has an intersubjective portion.

This model works appropriately when observed from the perspective of a first-generation cognitive science, where language works isolated in mental modules, in the absence of other cognitive faculties (Fodor, 1983; Gosselin, 2010). Nonetheless, a growing body of research insists on the interconnection of language with the faculties of the living body (Barsalou, 1999; Damasio, 2018; Lakoff, 2009; Maturana & Varela, 2004; Pulvermüller et al., 2012). What this means is that language occurs thanks to the role that experience (Rohrer, 2007), in terms of body movements, kinesthesia, proprioception, and interoception, plays in meaning construction (Spackman & Yanchar, 2014). Put simply, the instance of validation, if not explained from an embodied perspective, would face important challenges in being considered a cognitive mechanism in humans at all.

Modular perspectives would not be able to explain milestone evidence, such as why mental states in humans switch according to somatic markers (Damasio et al., 1991), how it is possible to feel someone else's pain, emotions or enthusiasm (the mirror neuron system) (Rizzolatti & Rozzi, 2016), and why it is possible to change a moral judgment depending on the language spoken in bilingual subjects, their context, and personal conditions (Corey & Costa, 2015; Greene et al., 2001; Restrepo-Rodas et al., 2021). As it can be inferred, the concepts of subjectivity, objectivity and institutions are immersed in such evidence, but how they can move from one validation

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framework to another should be the work of the instance of validation. Therefore, this study aims at bridging the gap between the instance of validation and embodiment, by providing empirical data of its structure, function and functioning in terms of the socio-physical experience that leads to the construction of mental representations. To that end, the study embraced an ethnomethodological design that allowed the design, validation, and application of an individual semi-structured interview about harming or helping the environment.

The following paragraphs are structured in five sections. The first section explores the notions about the instance of validation from the analytic, linguistic, and cognitive perspectives. It also delves into research reports aiming at providing an understanding of embodiment and validity / truth / validation, all of which are possible thanks to the instance of validation. This section ends with the formulation of the research hypothesis. In the next section, the methodological framework is depicted. It begins with the ethnomethodological research design and its importance for the identified research gap; then it continues by stating the postulates that cover the cognitive and linguistic phenomena to be analyzed. After that, it shows the validation of the individual semi-structured interview as well as the rubrics for analyzing the data. The third section is devoted to the results of the study, which are grouped into two main categories: (a) the structure, and (b) the functioning of the instance of validation in the embodied mind. The fourth section confronts the findings of the study with those reported in previous literature. Finally, the last section presents the conclusion, some implications of the study, and prospective venues for future studies.

Theoretical Framework

The instance of validation is a concept intrinsically born from Aristotle's works on logics (On Interpretation; Aristotle, 1967), ethics (Nicomachean Ethics; Aristotle, 1983) and subjectivity (Rhetoric; 1967) as these works are conceived on reflections about objectivity, subjectivity, and institutions. However, the first author to use the term in linguistics was Alain Berrendonner (1981), who employed the term 'validation' as opposed to 'validity' in the sense that a relation is created between a proposition and an instance of validation that gives it a certain kind of validity (Gosselin, 2010). This quick overview of the concept covers both the scientific and non-scientific domains, which is the reason why scientists can come to conclusions following a specific method and non-scientific individuals can also predict events, make judgments, and even create fiction; in other words, they can behave both as scientists and moralists (Knobe, 2010), it can be argued, by employing the cognitive mechanism called instance of validation.

Given the fact that the concept of instance of validation emerges from the concept of validity, it necessarily touches upon age-old debates in philosophy, such as the dichotomy between the theoretical and practical worlds (Aristotle), and the impossibility to derive an 'ought to' from an 'is' (Hume). Conversely, with the emergence of analytic philosophy, several researchers began to establish the possibilities for deriving obligations from factual matters. For instance, Searle (1964) provided an analysis of how illocutionary and perlocutionary acts, like making a promise, can turn into a prescriptive act that can ultimately be judged (Jaramillo, 2013). In a similar account, Rodríguez (2020, p. 20) argued that "a subjective phenomenon can achieve an epistemic objectivity" in a way that a moral judgment can be objective, although not absolute. In consequence, analytic philosophers do consider the Aristotelean and Humean problems to be solvable. In that sense, the transit from objectivity to subjectivity (and to institutions) seems possible and of primary importance for the construction of validity and morality, to mention a few cases.

Furthermore, cognitive scholars have suggested that mental models (a kind of solid mental

representations) are formed as a mechanism for incorporating prototypical experiences that address the problem of fallacies in traditional logic, since a syllogism can be valid but not true (Garnham & Oakhill, 1996). In fact, Van Dijk (2014) enumerated several kinds of mental models that are crucial for adapting human behavior, which are contextual and cultural. In general terms, either model depends on some validity criteria, be it a sort of "correspondence with reality or another truth maker in the world" (Van Dijk, 2014, p. 30). Hence, the author considers it possible that beliefs (either collective or personal) evolve as knowledge, especially in the cases where beliefs are justified and true. Evidently, this conception of mental models embraces the instance of validation, which in Van Dijk's (2014) theory of discourse and knowledge is understood in an evolutionary form, however disembodied.

In cognitive linguistics, the prior incursion of embodiment into diverse concepts, like 'time' and 'the self', overshadowed the development of the concept of validity, hence that of the instance of validation. As a matter of fact, from a realist standpoint, Lakoff and Johnson (1999) ironically assumed truth accurately yet also overtly when stating that "[w]hat we take to be true in a situation depends on our embodied understanding of the situation" (Lakoff & Johnson, 1999, p. 102). Such an assertion results adequate in the sense that embodiment plays a crucial role for assigning truth and validation to a concept, as we showed in the introduction section, but the authors did not provide a concrete development of truth based on an objectivist epistemology.[2] However, the closest they arrived to that goal was the development of the notion of primary and secondary metaphors which makes it possible to think where factual reality (lived experience) is mapped onto concepts, which is the case of moral metaphors

(well-being, accountability, nurturing and purity) that come from experiential events, namely, weight, strength, physical support, smell, moving, spatial landmarks, and so on.

Both kinds of metaphors can be construed in terms of image schemas (Restrepo-Rodas, 2024). Image schemas are defined as "the recurring patterns of our sensory-motor experience by means of which we can make sense of that experience and reason about it"; such image schemas "can also be recruited to structure abstract concepts and to carry out inferences about abstract domains of thought" (Johnson, 2005, pp. 18–19). Thus, the above-mentioned recurring patterns also shape the instance of validation for the emergence of truth. Subsequently, validating any form of reasoning, concepts, representations (personal or collective), and even actions, should be infused by image schemas. The foregoing is also valid for any mental state which houses volition, intentionality, and a state of affairs (e.g., probability, possibility, certainty, etc.—Cifuentes, 2012). In other words, conceiving the instance of validation as an image schema, that is, as an abstracted embodied container in a mental space where cognitive processes take place in forms of patterns (Tay, 2021), is both possible and required.

Nowadays, embodiment has gained even more attention from scholars in cognitive linguistics (Wen & Jiang, 2021). To illustrate, De Vega (2022) systematically reviewed research where there is sufficient evidence to admit a causal role of embodiment in meaning construction. Part of the evidence the author analyzes comes from subjects who suffer from Parkinson's disease (PD) and present difficulties in processing action verbs. Similarly, Bocanegra et al. (2015) not only found action verbs difficulties in PD patients, but also in syntax, action semantics, and object semantics difficulties. In general, through behavioral and novel technology (e.g., fMRI and EEG), the authors (De Vega and Bocanegra's team) observe that there is still activation of the sensory-motor cortex in

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2   The mere assumption of subjectivity may not be accurate to model cognitive processes that reside in lower scales, such as the cognitive unconscious, and therefore lack empirical support beyond linguistic elements.

the brain when processing action-related forms of language, even in abstract concepts (nouns). Interestingly, De Vega suggests that PD individuals simulate concrete physical experience when being asked about abstract concepts like 'true' and 'false'. As it can be observed, the possibility to use different neuronal and subcortical structures may rely on the instance of validation mechanism.

Moreover, research has also been carried out on the polyvalence of the instance of validation that begins with concrete (factual) domains and extends to other domains, beyond metaphors. Indeed, Restrepo-Rodas et al. (2022) explored the notion of the instance of validation in the Spanish polysemous verb '*tocar*' that can be used in a factual scenario as well as in prescriptive and axiological ones. The authors conclude that the expressions where '*tocar*' expresses a sense of touching ('*tocar el piano*'), obligation ('*toca prolongar la medida*') and axiology ('*tocaba tener cuidado con el fútbol*') are possible via the activation and inhibition of mental spaces. However, the authors assert that a clear-cut role of embodiment in the polysemy of such a verb (and related expressions) should explore deeper elements related to the exertion of force (i.e., motion, space, and time).

Naturally, theoretical accounts exploring the role of force in cognitive linguistics are not new, but as Gärdenfors (2014) points out, "forces and actions are not well developed in cognitive linguistics" (p. 14). This is primarily due to the fact that most of the approximations to force take it as psychosocial phenomena, that is, they assume that physical force, perceived by the senses and analyzed by the brain, is somehow translated into instances of mental agonists and antagonists (Croft, 2012a; Talmy, 2000) that help in shaping concepts of causality, freedom and events in metaphorical ways (Lakoff & Johnson, 1999). Recently, a more rigorous approach was suggested by Gärdenfors (2014), following Wolff's (2007, 2008) model of dynamics: Gärdenfors (2014) provided a model based on geometry and vectorial algebra of force as

fundamental for actions and events. Nonetheless, neither of these attempts has thoroughly developed an understanding of image schemas vis-à-vis kinetics and kinematics capable of modelling a realistic and objectivist standpoint of Newtonian physics, the force humans transform from their real experience. This is basically the byproduct of assuming relativist positions in understanding the role of concrete physical experiences as a factual source of processes in the mind (Evans & Green, 2006; Sinha, 2007), as is the instance of validation.

All in all, the instance of validation appears to be a cognitive process that is fundamental for concepts to gain stability. Although the problem of categorizing subjectivity, objectivity and institutions begins in traditional logics, it extends to cognitive linguistics, (Ellis, 2019). In the latter discipline, the crucial factor is not only to observe the linguistic mechanisms that make its use evident, but also its internal constitution as an image schema. Although Gosselin (2010) provides an important approximation to the structure of the instance of validation in the mind, it still lacks a comprehension of the phenomenon in terms of embodiment, mainly because his theoretical account stems on a symbolic and conceptual reach.

Likewise, research on embodied concepts (truth, falsity, validity, etc.) still lacks a clarification of the concrete components that make it possible to suggest the instance of validation as an image schema. What is more, embodied mechanisms explaining concepts formation, actions, and events still miss the real patterns that model the instance of validation and similar cognitive processes. Hence, this study aims to corroborate the following hypothesis: the instance of validation is constructed from embodied human experience. To prove this hypothesis, the study proposes an understanding of the socio-physical mechanisms that support the instance of validation in the group of participants who were interviewed about a controversial matter: harming versus helping the environment.

Methodology

This study contemplated a qualitative scope since it analyzed linguistic data as a window to understanding cognitive phenomena. However, it embraced quantitative strategies that allowed for the theoretical and empirical modeling of the instance of validation as an image-schema. In this sense, the study triangulated data of diverse natures as suggested by cognitive linguists when doing empirical research (Gibbs, 2007).

Research Design

Since cognitive processes can be observed indirectly through language, this study assumes an ethnomethodological design as it is in charge of studying the methods that "individuals use to make sense of everyday social environments, and the common-sense strategies that they use in these environments to accomplish the tasks of communicating, making decisions and reasoning" (Gall et al., 1996, p. 626). To that notion, it can be added that the researcher occupies a privileged position for interacting and promoting the data to be analyzed via linguistic and communicative scenarios (Francis & Hester, 2004). What is more, ethnomethodology offers the facility to use diverse kinds of data collection that can be presented in different formats, that is, from audio to text to image and so on (Firth, 2010). Hence, the unit of observation in this study was participants' language productions, which were recorded in audio then transcribed into text following Deslauriers' (2019) method for transcribing data. Regarding bioethical procedures, the study adhered to the Resolution 08430 of 1993 indicating a *minimal risk* category.

Characteristics of the Unit of Analysis

In cognitive linguistics, units of analysis can be of diverse natures, allowing principles from different disciplines to be present at the same time for the sake of a new ontology. Correspondingly, our collected linguistic data are assumed to have six specific properties, defined in the following lines:

(a) The experientialist position, which "emphasizes the view that human reason is determined by our organic embodiment and by our individual and collective experiences" (Geeraerts & Kuyckens, 2007, p. 5); (b) the salience principle emerges from experience since "various portions or aspects of the expression, content, and context have differing degrees of salience" (Talmy, 2007, p. 264)—from it derives the background principle; (c) which is composed of the remaining parts that are not salient (Evans and Green, 2006). These postulates lead to the interaction principle (d) that dictates that interaction among humans is pivotal both for the construction of thought and the development of communication (Evans, et al., 2007).

What is more, (e) the transitions from personal to social forms of cognition are possible, which is therefore an unavoidable principle because "processes in the mind are instances of general social cognitive abilities as well as individual cognitive abilities" (Croft, 2009, p. 412). Such abilities lead humans to create image schemas (f), defined as "a schematic representation emerging from embodied experience, which generalizes over what is common to objects" (Evans & Green, 2006, p. 191). Hence, image schemas are an important characteristic of cognitive, bodily and linguistic data. Some of the main image schemas include containment (Lakoff & Johnson, 1999), spatial relations (Lakoff, 2016), force systems (Talmy, 2000; Gärdenfors, 2014; Wolff, 2007; 2008), locomotion (Evans & Green, 2006), time (Evans; 2004; Gosselin, 2005), and temporality (Gosselin, 2010; Langacker, 2008). The unit of analysis of this study was the predication (Gosselin, 2010), as it expresses the image schemas and the other embodied principles that give rise to cognition in humans.

Instruments

With the aim of observing the unit of analysis thoroughly, both qualitative and quantitative instruments were selected to collect the data of

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the study. In ethnomethodology, applying interviews offers the possibility of searching for the concepts that construct individuals' reality and the way they form an epistemic state of affairs (Gall et al., 1996). Such concepts are captured by linguistic productions that can be studied and analyzed for modeling the intended cognitive processes. As a result, the collected data in can be systematically analyzed for the sake of modeling the instance of validation. The next sections deploy the type of interview we applied, and the procedures held in the analytic method we constructed and validated.

The Interview

An individual semi-structured interview was designed. The main topic to be discussed was the environment, a topic of current interest. It consisted of three types of questions (beginning, middle, and final questions). Eminently, the middle questions represented the core of the study, since they sought mental representations of the participants about harming and protecting the environment. To illustrate, questions like "What do you think about people who take action to protect the environment?" (Restrepo-Rodas, 2024, p. 83) were posed and discussed by the researcher and the participants individually. The interview followed a protocol (Alonso, 2007) that granted the same procedures and time for each participant. It lasted from 7 to 10 minutes and occurred spontaneously after signing the agreement to participate in the study.

Before the application of the interview, the protocol was examined by seven experts who provided both a qualitative and a quantitative assessment. Generally speaking, some modifications were suggested for some terms and instructions (e.g., Judge 7: "I suggest that you replace the term 'vignette' for 'item', as it may sound more familiar to the participants" and Judge 3 "since the two moral situations are too similar, consider giving a longer time for participants to analyze the situations and provide their real answers"). Also, the judges rated (a) the

Table 1 Validation of the Semi-Structured Individual Interview

Instrument	Descriptors	Expert's Mean	Instrument Mean
2) Semi-structured individual interview (Delgado & Gutiérrez, 2007)	Content	4.43	4.52
	Methodology	4.43	
	Item instruction's clarity and precision	4.29	
	Linguistic content and formal presentation	4.86	

Source: Restrepo-Rodas (2024, p. 107)

content, (b) the methodology, (c) the clarity and instructions of each item, and (d) the linguistic content (formal presentation) of the interviews. From that process, the quantitative mean of each item was obtained, as well as the overall mean for the instrument. In fact, in a scale from 0 to 5, the interview obtained a mark of 4.52 (Table 1), a score which indicates an excelling assessment of the instrument.

Analytic Method

Having considered the principles of embodiment in cognitive linguistics, a guide was created to orient the image schemas to be modelled in the analytic rubric. In principle, four levels constituted the image schemas that would represent the linguistic corpora. Level 1 condensed the sorts of image schemas that represent the instance of validation as well as other cognitive processes, such as the direction of fit and the force of validation (Restrepo-Rodas et al., 2025). Level 2 presented the kinds of realities that were characteristic of the linguistic corpora; some of such realities are the immediate, perceived, projected and necessary realities. Level 3 portrayed the agents in forms of containers that possess qualities and acquire roles, like the source-path-goal schema (e.g., the chairman of the company who wants profit). Level 4 indicated the kinds of relations, in the forms

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Table 2 Validation of the rubric for the bases of embodiment in the cognitive unconscious and its operationalization

Instrument	Descriptors	Expert's Mean	Instrument Mean
7) Rubric for the bases of embodiment in the cognitive unconscious and its operationalization	Content	4.86	4.79
	Methodology	4.57	
	Item instruction's clarity and precision	4.86	
	Linguistic content and formal presentation	4.86	

Source: Restrepo-Rodas (2024, p. 112)

of trajectories (inside-outside, vertical stability, inhibitory force or cause), that the agents can achieve given the other levels.

Based on the proposed guide, an analytic rubric was constructed, where the analyst found instructions for filling out a chart. In the chart, the objective was to categorize participants' language productions into a category of modality that indicated a specific kind of instance of validation. The operationalization of the rubric continues horizontally with the enumeration of the image schemas employed, the visual representation of such image schemas (a conceptual model), the expression of such a model and a final proposal for a mathematical or a physical model. As in the interview design, this material went through the assessment process, obtaining a higher general mean: 4.79 (see Table 2). In summary, both the interview and the analytic strategy were approved for application.

Participants

The ethnomethodological research design adopted for the study indicated several general criteria for the selection of the participants. First, there should be a common ground between the researcher and the participants, since it favors smoother interactions and more compelling contributions from participants (Croft, 2009). Second, the social frame between the participants and the researcher had to be highly similar (Fillmore, 1982; Aarsand & Aarsand, 2018). Third, similar epistemic memories (interactions) had to be considered for selecting the participants (Van Dijk, 2014). Hence, after careful consideration of the three guidelines of the research design, the researcher opted for inviting a group of undergraduate students who were attending an interculturality course at a public university in Colombia. From a population of 27, only 13 decided to participate by signing the informed consent. They were in the 7th semester of a Bachelor of Arts in Languages, were between 21 and 23 years of age, and were born in Colombia.

Results

Once the data were transcribed, it was segmented into units of sense, that is, the union of markers that develop an idea. In Gosselin's (2010) theory, this is known as the predication: a subject and what is related to it (actions, states, etc.). In front of the predications, a specific modal tag was added, indicating a specific kind of modality: alethic, epistemic, volitive, deontic, appreciative, and axiological. To avoid ambiguity, there was recourse to the salience principle (Talmy, 2007) so that a kind of modality was salient. As it was stipulated in Gosselin's (2010) theory, the modalities can be grouped to categorize their instances of validation. Hence, the alethic modality is construed

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thanks to objective reality, the epistemic, volitive, appreciative and volitive modalities are formed based on subjectivity and the deontic and axiological modalities are based on an institutional stance. In the corpus, there were manifestations of all the kinds of modalities, but a further step was to provide a clear-cut distinction of the different categories that make a specific modality and that are visible in the instance of validation image schema (IOVIS), as it was proposed in the analytic rubric.

To do so, the representativeness of the predications led to the consolidation of twelve categories. In the objectivity portion, conventional truths, primary metaphors, logics and causality, natural habits, and non-conventional truths were identified. In the subjectivity category, intuitions, feelings, individual judgments, collective judgments, and interpersonal judgments were detected. In the institution category, weak axiology and deontology as well as strong axiology and deontology were observed. As these categories began to appear, they also brought in the specific qualities that make it possible to identify their structure in the IOVIS. As it was mentioned before, the qualitative relation between the axis of variability among individuals (x) and the axis of the variability in conventionality (y) fostered the primary structure of the image schema, although some modifications were carried out for accurately representing the patterns it condenses.

The Structure of the Instance of Validation

The analyses held in the rubric indicate that the two dimensions giving rise to the IOVIS needed to have exact and equal distances for the sake of symmetry. Furthermore, since image schemas are the patterns that humans abstract in the mind (Tay, 2021), a distance that is perceivable and typical for them, based on their experience (Gärdenfors, 2014), could represent the distance from a point to another in either axis. This is why one *centimeter* was considered to represent that logic (Goldman, 2012). Moreover, the constant apparition of different

Figure 2 The Instance of Validation Image Schema's Structure Applied to Feelings and Intuitions
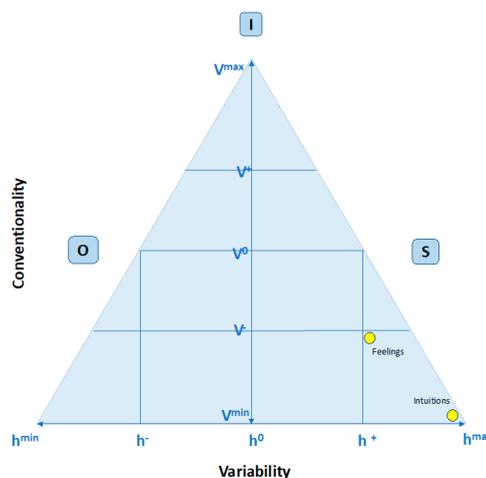
Source: Restrepo-Rodas (2024)

categories in a specific area made it necessary to differentiate among them by means of a specific value: proximity ($\approx$). In this way, several categories appeared in a specific area of the instance of validation, but were represented in a specific point, that is, emergent coordinates appeared in the analysis. For instance, the categories of intuitions and feelings share some part of the same area (h^+, h^{max}), but they are different in the sense that intuitions have a tendency towards h^{max}, while feelings' tendency is towards h^+ (Figure 2).

Excerpts expressing feelings "I hate wasting water; it just makes me so angry, very angry" (3U12P1)[3] or intuitions "I have a great sensitivity for natural resources" (5U5P2)[4] portray very precisely the tendency to a lesser or a higher degree of both conventionality and intersubjectivity. Therefore, having the proximity value helps in aspiring for a more precise way to model the image schema at hand, just as it was proposed in Gärdenfors' (2014) modelling of events and actions, and in Wolff's (2008) model of dynamics of causal events. Nonetheless, our approach to modelling

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3 **3U12P1:** eso [derrochar el agua] si es que me choca, me da muchísima rabia, me da muchísima rabia

4 **5U5P2:** digamos que yo tengo una gran sensibilidad respecto a los recursos naturales

the IOVIS, however geometrical in its structure, is fore and foremost physical as it embraces kinetics and kinematics for its functioning.

Another important finding is that any new specific coordinate can appear in relation to both axes, leaving room for other coordinates to appear. As shown in Figure 2, intuitions can now be located in $[((h^+, h^{max}(\approx h^{max})), (v^-, v^{min}(\approx v^{min}))]$ and feelings in $[((h^+, h^{max}(\approx h^+)), (v^-, v^{min}(\approx v^-))]$. In other words, the concepts supported under the categories of intuitions and feelings are both cases of the subjectivity pole; they are also distinguishable in the specific areas mentioned in the instance of validation container. What is more, the analyses also pointed out that no absolutes can represent a coordinate in the IOVIS. Said otherwise, no concepts can be placed in h^{max}, v^{max}, h^{min}, and v^{min} because there is a relation among the two dimensions (intersubjectivity and conventionality) that stands against the purity of concepts. As a matter of fact, our data did not show any absolute objective, subjective or institutional stance, which is a relevant finding of the study.

Evidence Supporting the Subjective Instance of Validation

Along the intuitions and feelings' categories, individual, collective and interpersonal judgments appeared as consolidated categories of the subjective instance of validation; in passing, let us recall that such judgments compose the epistemic, volitive and appreciative modalities. In fact, Table 3 exemplifies the salient concepts in the predications (the coded excerpts). First, excerpt 9U2P2 indicates that the participant operates unconsciously vis-à-vis their own actions impacting the environment, which encompasses an indifferent value of the volitive modality. Second, excerpt 9U7P7 expresses a feeling of deserving, which entails an appreciative modality. Third, excerpt 1U2P2 showcases a participant's judgement about their own behavior; it conveys a subjective comprehension of the reality upon which the person reflects. Fourth, excerpt 10U4P4 expresses an undesirable situation (collective judgment) where there is opposition between an ideal situation and its counterpart and clearly entails an appreciative modality. Finally, excerpt 10U11P5 states an

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Table 3 Kinds of Subjectivity in the Instance of Validation Image Schema and their Structure

Code and Excerpt	Kind of Subjectivity	Variation among Individuals (x)	Conventionality (y)
9U2P2: Well, it is not like I am very conscious of what I do to protect the environment[a]	Intuitions	$[((h^+, h^{max}(\approx h^{max}))$	$(v^-, v^{min}(\approx v^{min}))]$
9U7P7: and I do not want anything else because it is just fair, and it is what I deserve[b]	Feelings	$[((h^+, h^{max}(\approx h^+))$	$(v^-, v^{min}(\approx v^-))]$
1U2P2: Sorting my waste need not represent a great effort for me[c]	Individual (epistemic, volitive, appreciative) Judgments	$[((h^+, h^{max}(\approx h^+))$	$(v^-, v^0(\approx v^-))]$
10U4P4: If there are no laws aiming to protect the environment, it results in selfish people who only think about their profit, which is monetary profit[d]	Collective (epistemic, volitive, appreciative) Judgments	$[((h^0, h^+(\approx h^+))$	$(v^-, v^0(\approx v^-))]$
10U11P5: because fast fashion is one of the most common sources of planet pollution[e]	Interpersonal Judgments	$[((h^0, h^+(\approx h^0))$	$(v^-, v^0(\approx v^-))]$

(a) **9U2P2:** Pues no es como que yo sea muy consciente de lo que hago por el medio ambiente.
(b) **9U7P7:** y no quiero más porque siento que es lo justo y es lo que, lo que merezco.
(c) **1U2P2:** nada me cuesta dividir mi basura.
(d) **10U4P4:** Si no hay leyes que protejan el medio ambiente, entonces sólo velan por intereses propios, monetarios en su mayoría.
(e) **10U11P5:** porque la *fast fashion* es algo de lo que más contamina al mundo y al medio ambiente.

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Table 4 Kinds of Subjectivity in the Instance of Validation Image Schema and Their Structure

Code and Excerpt	Kind of Axiology / Deontology	Variation among Individuals (X)	Conventionality (Y)
10U8P1: Hmm, that's okay for me, but I don't think radicalism of any type is okay / **12U5P3:** I could stop consuming so many plastic-based objects[a]	Weak Axiology and Deontology	$[((h^0,h^+(\approx h^0))$	$(v^0,v^+(\approx v^0))]$
13U11P6: so, is the chairman guilty? Yes, he is / **11U4P9:** I mean, one must respect, you do not do that[b]	Strong Axiology and Deontology	$[((h^0,h^+(\approx h^0))$	$(v^+,v^{max}(\approx v^{max}))]$

(a) **10U8P1:** Mmm, a mí me parece bien, pero no me parece bien el radicalismo en ninguna de sus formas / **12U5P3:** podría dejar de consumir tantas cosas con plástico... (b) **13U11P6:** Entonces ¿tiene la culpa? Sí, tiene la culpa / **11U4P9:** o sea pues tienes que también respetar, eso no se hace. *Source:* Restrepo-Rodas (2024, pp. 219–220)

interpersonal judgment, where the participant uses a commonly used concept in the business milieu: 'fast fashion', indicating the appreciative modality.

Evidence Supporting the Institutions-Based Instance of Validation

The institutions-based instance of validation is proof of intersubjectivity in the mind, since it takes place at the frontier of subjectivity and objectivity. More precisely, it originates in the region v^0, v^{max}, since it is the positive dimension of conventionality; it also covers some part of the h^-, h^+, because axiology, deontology, conventional truths, among others, are bound by an interpersonal agreement about specific representations which are culturally constructed. Some of the categories evidenced are grouped as strong axiology and strong deontology (v^+,v^{max}), on the one hand, and weak axiology and weak deontology (v^-,v^+), on the other. This sort of institutional stance stems from the subjectivity pole, which is why morality and axiology cannot, arguably, aspire to objectivity[5] (Hume, 2000; Knobe, 2010; Rodríguez, 2015, 2018, 2020). In Table 4, there is one example for each category and their specific location in the iovis.

Evidence Supporting the Objective Instance of Validation

The objective instance of validation ranges from the minimum convention and personal objectivation of reality (h^{min}) to the interpersonal lot and lower degree of conventionality (h^0,v^{min}) to the maximum conventionality (v^+,v^{max}), as shown in Table 5. To provide a sense of the categories, each category's excerpt is depicted in turn. In excerpt 4U14P3, the participant acknowledges possessing a carbon footprint, a conventional truth shared by the participant. In excerpt 7U2P1, there is a cause-and-effect reasoning about helping the environment, a typical logical and causal process. These categories have a more conventional acceptance since they arise in the interpersonal region v^-,v^{max}. Conversely, the next two categories belong to a more personal stance since they now tend toward h^- (natural habits) and h^{min} (non-conventional truths). In fact, in excerpt 2U8P2, the participant mentions that humans must use natural resources to sustain life. Finally, the excerpt 4U8P3 refers to universal truth, which is a kind of truth that is atemporal and non-conventional and applies exclusively for an individual who assumes it as objective even in the absence of conventionality.

The Singularity of Primary and Secondary Metaphors

A striking finding of the study of the iovis was the precise coordinates where primary and

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5   The singularity of primary and secondary metaphors appears to be great candidates for explaining how morality stems from objectivity without being objective at first. However, the reach of this research report may require further developments and deeper analyses of our data.

Table 5 Kinds of Objectivity in the Instance of Validation Image Schema and Their Structure

Code and Excerpt	Kind of Objectivity	Variation among Individuals (X)	Conventionality (Y)
4U14P3: I mean, that increases my carbon footprint[a]	Conventional truths	$[((h^0,h^-(\approx h^0))$	$(v^+,v^{max})]$
7U2P1: Because… somehow, he [the chairman] did help the environment intentionally[b]	Logics and causality	$[((h^0,h^-(\approx h^0))$	$(v^-,v^0)]$
2U8P2: I mean, we live thanks to the environment, water, to everything, that everything be in good shape[c]	Natural habits	$[((h^0,h^-(\approx h^-))$	$(v^{min},v^-)]$
4U8P3: because that is what humans do, seek solutions to problems[d]	Non-conventional truths	$[((h^-,h^{min})$	$(v^{min},v^-)]$

Notes: (a) **4U14P3:** O sea, eso incrementa como el tamaño de mi huella de carbono. (b) **7U2P1:** Porque… él de alguna manera intencionalmente sí ayudó al medio ambiente. (c) **2U8P2:** O sea nosotros vivimos por el ambiente, el agua, todo, que todo esté bien. (d) **4U8P3:** porque pues eso es lo que hace el ser humano, buscar soluciones a problemas. *Source:* Restrepo-Rodas (2024, p. 245)

secondary metaphors emerge. Indeed, since primary metaphors have the property of mapping socio-physical experience into other concepts (Lakoff & Johnson, 1999), they need to belong to the instance of validation which is conventionally agreed on by groups of individuals $[(h^-, h^0), (v^0, v^+)]$. Otherwise, they would fall into the science fiction domain. However, the fact that primary metaphors can turn into secondary ones when framed in cultural scenarios (Lakoff, 2016) makes it possible to assert that secondary metaphors can take place in any part of the IOVIS but the source domain, that is, the primary metaphor lot $[(h^-, h^0), (v^0, v^+)]$. Therefore the axiom $[(\forall h \in h^0, h^-(\approx h^-)) (\forall v \in v^0, v^{max})]$, which makes it possible to understand why moral metaphors involving consciousness as a feeling of remorse or the being mindful about something negative are expressed through terms such as load or cargo (excerpt 2U10P10), or the color green representing dollars and being able to express moral matters. In Table 6, these and other examples are portrayed, and, in Figure 3, their representations are shown.

In summary, this section provided the most prominent findings that sustain the IOVIS as an accurate model of socio-physical experience in terms of patterns, as it is suggested by the authors who coined the concept (Lakoff & Johnson, 1999). The first part of this section began with the adjustments required to model the image schema in question. To that matter, some postulates were added: adjusting each gradient on the axis at 1 centimeter, adopting the proximity value ($\approx$), allowing both axes integrally for the emerging categories, and avoiding extreme coordinates to take place as it would mark pure concepts, which are not possible in a relation of two dimensions (axes h and v). The second part provided the categories that emerged during the analyses and that were consolidated via multiple predications, some of which are detailed for each category (Figure 4 gathers such categories). With that being said, the next section indicates the functioning of the IOVIS.

The Functioning of the Instance of Validation

A deep consideration of the faculty of validating concepts in the mind leads to a higher level of comprehension of the phenomena at stake: its functioning. Consequently, the second objective of the study was to pinpoint the mechanisms that make the instance of validation an image schema: a pattern derived from human experience (Tay, 2021). For that purpose, the last part of the analytic rubric aimed to gather the geometrical and physical expressions that could model the functioning of the instance of validation image schema. Nonetheless, this part of the study faced the challenge of infinite

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Table 6 Conceptual Metaphors' Structure in the Instance of Validation Image Schema

#	Excerpt	Source Domain	Target Domain
1	**3U6P2:** And especially her, having the ovaries, haha, to stand on a stage and talk about tha'a	**Strength:** $[((h^0,h^-(\approx h^-)(v^0,v^+))]$	**Strict father family model:** $[((h^+,h^{max}(\approx h^{max}))(v^-,v^{min}(\approx v^{min}))]$
2	**3U7P16:** So, like, I feel I would die, no… I think I'd sink into depression[b]	**Moving:** $[((h^0,h^-(\approx h^-)(v^0,v^+))]$	**Well-being** $[((h^+,h^{max}(\approx h^+))(v^-,v^{min}(\approx v^-))]$
3	**13U14P5:** The world is harsh and also chaotic[c]	**Force:** $[((h^0,h^-(\approx h^-)(v^0,v^+))]$	**Strict father family model:** $[((h^+,h^{max}(\approx h^+))(v^-,v^0(\approx v^-))]$
4	**1U7P2:** Because our routine is "don't give a fuck" about the environment[d]	**Physical support** $[((h^0,h^-(\approx h^-)(v^0,v^+))]$	**Hindering:** $[((h^0,h^+(\approx h^+))(v^-,v^0(\approx v^-))]$
5	**8U4P5:** Then they come to third-world countries like ours and sell them at very high prices[e]	**Space:** $[((h^0,h^-(\approx h^-)(v^0,v^+))]$	**Wealth:** $[((h^0,h^+(\approx h^0))(v^-,v^0(\approx v^-))]$
6	**3U10P10:** Actually, I do not picture myself owing a big company that is exclusively chasing "the green" and nothing else, without caring about anything else[f]	**Color:** $[((h^0,h^-(\approx h^-)(v^0,v^+))]$	**Wealth:** $[((h^0,h^+(\approx h^0))(v^0,v^+(\approx v^0))]$
7	**3U7P22:** Knowing that, in a way, you're contributing to widening that social gap——where some benefit and others don't[g]	**Space:** $[((h^0,h^-(\approx h^-)(v^0,v^+))]$	**Accountability:** $[((h^0,h^+(\approx h^0))(v^+,v^{max}(\approx v^{max}))]$
8	**13U15P4:** They teach you, they put you through university—not so you can think, not so you can do research, not so you can make the world a better place, but so you can give your labor to… to capital[h]	**Exertion of force:** $[((h^0,h^-(\approx h^-)(v^0,v^+))]$	**Accountability:** $[((h^0,h^-(\approx h^0))(v^+,v^{max})]$
9	**11U7P3:** But I'd tell them that acting out of pure individualism won't get them anywhere[i]	**Moving:** $[((h^0,h^-(\approx h^-)(v^0,v^+))]$	**Strength (reaching a destination):** $[((h^0,h^-(\approx h^0))(v^-,v^0)]$
10	**4U8P1:** Because, as such… well, we're parasites here[j]	**Proximity in space:** $[((h^0,h^-(\approx h^-)(v^0,v^+))]$	**Purity and Well-being:** $[((h^0,h^-(\approx h^-))(v^{min},v^-)]$
11	**2U10P10:** plus, I would feel great about my consciousness being relieved (removing a cargo) from destroying something that won't last forever[k]	**Weight:** $[((h^0,h^-(\approx h^-)(v^0,v^+))]$	**Well-being:** $[((h^-,h^{min})(v^{min},v^-)]$

Notes: (a) **3U6P2:** y sobre todo ella, tener los ovarios jaja para pararse en un escenario y hablar de eso.
(b) **3U7P16:** entonces como que no, me muero, no, yo creo que yo entraría en depresión.
(c) **13U14P5:** Este mundo es duro y es caótico además.
(d) **1U7P2:** porque nuestra monotonía es *don't give a fuck about the...* del medio ambiente.
(e) **8U4P5:** luego vienen a, como países de acá de tercer mundo y las venden muy caras.
(f) **3U10P10:** Ahora, yo no me imagino con una empresa gigante que está detrás como de solo "verde" y ya, que no le importe el resto.
(g) **3U7P22:** saber como que, uno está colaborando a que se aumente esa brecha social en que unos se benefician y otros no.
(h) **13U15P4:** A usted le enseñan, y lo meten en la universidad no para que piense, no para que investigue, no para que mejore el mundo, sino pa' que sea mano de obra del... del capital.
(i) **11U7P3:** pero le diría que... pues que actuando desde la individualidad no va a llegar a ningún lado.
(j) **4U8P1:** Porque pues de por sí, eeh... pues somos unos parásitos aquí.
(k) **2U10P10:** aparte de que me sentiría bien conmigo misma de no tener un cargo de consciencia de estoy destruyendo algo que no es infinito.
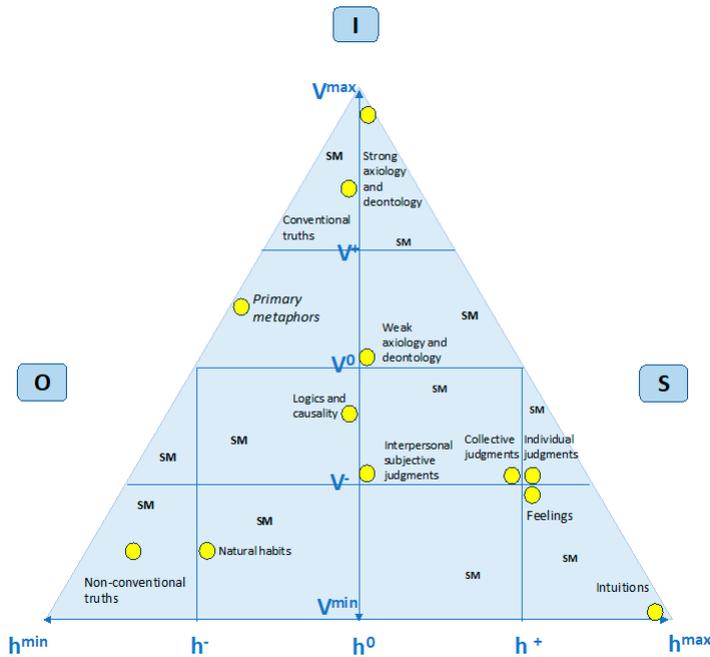*Source:* Restrepo-Rodas (2024)

Figure 3 Metaphors' Source and Target Domains in the Instance of Validation Image Schema
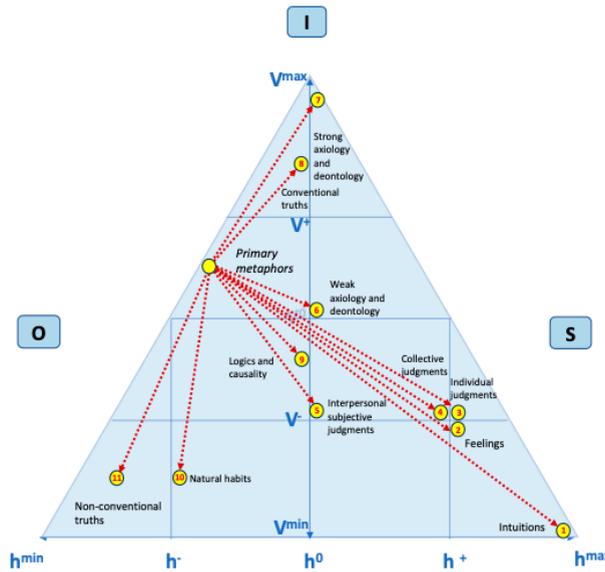
Source: Based on Restrepo-Rodas (2024)

Figure 4 The Instance of Validation Image Schema Construction

Note: SM stands for secondary metaphors. *Source:* Restrepo-Rodas (2024, p. 278)

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Figure 5 The ELINIM Image Schema

Source: Restrepo-Rodas et al. (2024, p. 290)

regression since the recurrent cause (Hume, 1739) was not identified. In other words, the question about what originates the coordinates that house the identified categories had to be solved.

Hence, the obvious way to avoid the cartesian magician controlling the emergence of the validation of concepts and the metaphysical possibilities was to include the abstraction of the individual as a complementary image schema. In this sense, considering that in cognitive linguistics, other cognitive processes may co-occur, the abstraction of the individual encompasses being conscious of the possibilities inside the iovis, recognizing identities that need to be distinguished among the possible categories, self-regulating potential acts in terms of alterity and empathy, among other faculties. The analysis of the preceding processes and their interactions resulted in a model that represent the abstraction of individuals in the mind: the elementary intercultural imprint (ELINIM) (Restrepo-Rodas et al., 2024) (see Figure 5).

The Geometry of the Instance of Validation Image Schema

Furthermore, with the ELINIM image schema located in the interpersonal space, more precisely in the coordinate (v^{min}, h^0), some geometrical relations could be established. First, following the pre-established triangle formed by axes x and y, a ray, which is a sequence of points with one point of origin extending infinitely in one direction, could be identified anytime a specific coordinate emerged. The result was specific angles to which the abstraction of the individual could direct their attention, marking a ray that connects the two lots: the categories considered sub-image schemas, and the ELINIM image schema. Second, by using the measures of each category represented by a coordinate, sub-triangles appeared to complement the geometry of the instance of validation major image schema. The result was a concrete observation of the distance from the abstraction of the subject, represented as the ELINIM image schema, to the coordinates by applying the Pythagorean theorem, that is, $C=\sqrt{(a^2+b^2)}$. The theorem was in turn applied to all the categories identified in the study, resulting in a clear characterization of the distances from the ELINIM to the 12 coordinates. See Figure 6 for a geometric representation of the iovis'.

Figure 6 The Geometry in the Instance of Validation Image Schema
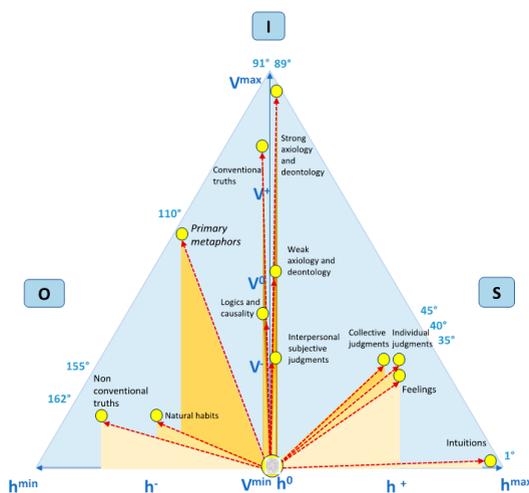
Source: Based on Restrepo-Rodas (2024)

The Physics Behind the Instance of Validation Image Schema

In cognitive linguistics, movement (motion) is a substantial source of information for patterns to occur, therefore, for image schemas (Lakoff, 2009). Then, the functioning of the instance of validation must operate under the same principle. Such functioning allows the ELINIM to approach the categories in the IOVIS. Given the possibilities to connect the ELINIM and the categories, the next step was deciphering the time it possibly takes to arrive at a specific instance of validation. Since the distance was already obtained, the next step was to assume a regular pattern of movement for the ELINIM to displace from the origin to the different Instances of Validation. The adopted constant was a velocity of 5 km per hour, which is the preferred walking speed of humans (Levine & Norenzayan, 1999).

Thereupon, the only remaining unknown variable was the time it takes the ELINIM to arrive to each coordinate (t: d/v). Once the ELINIM arrives at a frontier of the coordinates, they get activated, and the validation of concepts are thus applied. This principle of activation inhibits others (salience-background) largely accepted in physics (e.g., chemical and electric synapses) (Redolar, 2014). In a nutshell, classical Newtonian laws of motion can be the reason behind a functioning of the IOVIS that can be incorporated into human cognition through frequent patterns, which transform conscious mental life into unconscious habits, or image schemas. In sum, both the structure and functioning of the IOVIS are based on cognitive constructs, acquired and developed through a lifespan. Table 7 portrays the precise qualities for the categories identified in the study.

Discussion

A prior discussion of the findings here explained can be framed into two main arenas, namely the epistemology and the ontology of the IOVIS. To begin with, cognitive linguistics has traditionally admitted Lakoff and Johnson's (1999) epistemological viewpoint, that is, a realist position and a subjectivist

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Table 7 The Deep Components of the Functioning of the Instance of Validation Container

Instance of Validation	Variation among Individuals (X)	Conventionality (Y)	°	d	v	t
Intuitions	$[((h^+,h^{max}(\approx h^{max}))$	$(v^-,v^{min}(\approx v^{min}))]$	1°	1.9cm	5km/h	13,6ms
Feelings	$[((h^+,h^{max}(\approx h^+))$	$(v^-,v^{min}(\approx v^-))]$	35°	1.4cm	5km/h	10ms
Individual (epistemic, volitive, appreciative) judgments	$[((h^+,h^{max}(\approx h^+))$	$(v^-,v^0(\approx v^-))]$	40°	1.5cm	5km/h	10.8ms
Collective (epistemic, volitive, appreciative) judgments	$[((h^0,h^+(\approx h^+))$	$(v^-,v^0(\approx v^-))]$	45°	1.4cm	5km/h	10ms
Interpersonal judgments	$[((h^0,h^+(\approx h^0))$	$(v^-,v^0(\approx v^-))]$	89°	1.1cm	5km/h	7.92ms
Weak axiology and deontology	$[((h^0,h^+(\approx h^0))$	$(v^0,v^+(\approx v^0))]$	89°	2.1cm	5km/h	15.12ms
Strong axiology and deontology	$[((h^0,h^+(\approx h^0))$	$(v^+,v^{max}(\approx v^{max}))]$	89°	3.9cm	5km/h	28.08ms
Conventional truths	$[((h^0,h^-(\approx h^0))$	$(v^+,v^{max})]$	91°	3.5cm	5km/h	25.2ms
Primary metaphors	$[(h^0,h^-(\approx h^-))$	$(v^0,v^+)]$	110°	2.6cm	5km/h	18.72ms
Logics and causality	$[((h^0,h^-(\approx h^0))$	$(v^-,v^0)]$	91°	1.5cm	5km/h	10.8ms
Natural habits	$[((h^0,h^-(\approx h^-))$	$(v^{min},v^-)]$	115°	1cm	5km/h	7.2ms
Non-conventional truths	$[((h^-,h^{min})$	$(v^{min},v^-)]$	162°	1.6cm	5km/h	11.5ms
Secondary metaphors	$[(\forall h \in h^0,h^-(\approx h^-))$	$(\forall v \in v^0, v^{max})]$	0-180°	--cm	5km/h	--ms

Source: Restrepo-Rodas (2024, p. 245)

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interpretation of reality as opposed to the correspondence theory (Evans & Green, 2006; Restrepo-Rodas et al., 2025). The findings of the study partially coincide with such postulate in the sense that human bodily experience is real in terms of movement, force, containment, interaction, etc. (the realist standpoint) and it is the cognitive agent who transforms experience into concepts, reasoning, and action; not a subjectivist process, still an objectivist one. Correspondingly, this study provides evidence of a further element: the connection between being a realist and a subjectivist/objectivist.

In this sense, being a realist implies conscious mental activity, and being subjectivist/objectivist covers both conscious and non-conscious mental operations. The link between the two appears to be a habit as the product of bodily experience in charge of forming the geometrical, mathematical, and physical patterns that make cognitive processes possible. This seems nothing but the manipulation of both a realist and a subjectivist/objectivist manifestation of cognition in humans, in accordance with what is needed at the moment to be true (Lakoff & Johnson, 1999), but also valid, false, possible, intentional, volitive, axiological, and so on (Gosselin, 2010). For this to be possible, a holistic view of cognition is required, that of cognitive linguistics, so that no epistemological and theoretical violations typical to isolated disciplines arise.

Hence, the ontology of cognitive processes, like validating mental representations, seems to be of a heterogenous nature, beginning in factual bodily experience, passing through an agent, and residing as conscious and unconscious faculties available to be cognitively used when needed. This assumption challenges modular views of cognition (Fodor, 1983; Gosselin, 2010) that are exclusively of a symbolic or conceptual nature, avoiding an embodied one. Thus, the IOVIS appears to be functional to explain the process of assigning truth values to concepts in a flow from objectivity to subjectivity and institutions. This

can therefore contradict Van Dijk's (2014) disembodied assumption of evolutionary mental models becoming knowledge, as long as they are all based on the same principles, but with specific geometrical, mathematical and physical calculations. To exemplify, while it takes the ELINIM 10.8ms to reach intuitions and emotions in the IOVIS, it takes almost three times that value to get to Strong Axiology (28.08ms).

Furthermore, the IOVIS could support new attempts to provide possible explanations to traditional problems regarding morality and validity. In fact, several long-standing problems can be explored from a realist and subjectivist/objectivist epistemology, that of the embodied mind. Consider, for instance Hume's Guillotine, in which an agent cannot derive an obligation from factual matters, or Knobe's (2010) scientist and moralist person account, in which agents' judgments about others' intentionality are bound to their own moral standards. Similar endeavors are found in Restrepo-Rodas et al.'s (2022) work shedding light on the polysemy of the verb '*tocar*' in the Colombian Spanish variant, and the ways bilingual agents modify their moral judgments depending on the language they speak (Restrepo-Rodas et al., 2021).

In general, the IOVIS indicates that such problems are founded in the same embodied mechanisms that make it possible for humans to express objectivity, subjectivity and institution-based concepts, hence reasoning, affect, etc. In other words, morality does not seem to be a different construct, or to be excluded from cognition. Instead, it is just another instance in the validation process. Importantly, the findings of the study may respond to Greene's et al., (2001) neuroscientific data about why it takes longer to reason morally than to express a moral intuition or feeling. The answer would be found in the directions, angles, distances and time of displacement of the ELINIM in the IOVIS, executed in order to activate such constructs.

Conclusions

Taken together, the structure and functioning of the instance of validation as an image schema provide a clear-cut comprehension of the mechanism required to create mental representations of all sorts, prior to validation. It can be asserted that this process is a universal constant in human cognition as it operates the representational process that humans (mostly unconsciously) implement to create concepts, ideas, and reasoning. Consequently, the hypothesis that the instance of validation is construed from embodied human experience proves to be correct, as it was depicted with structure and functioning in the twelve categories found in the portions of objectivity, subjectivity, and institutions.

Although this conclusion is relevant for the field of cognitive linguistics, some implications in other domains arise. The iovis could be relevant in neurodevelopmental research, notably in neurodivergent populations. Although there is literature reporting the linkage of embodiment with other cognitive impairments, such as in Parkinson's disease (Bocanegra et al., 2015; De Vega, 2021), autism spectrum disorder (Giraldo et al., 2018), and ADHD (Kamp et al., 2014), the focus on how the representational processes occur in those populations is still incipient (Astington & Baird, 2015), given that the priority has been the study of neural correlates, psychometric cognitive batteries and tasks, and behavioral trials. This means that the study of the ways in which neurodivergent individuals conceptualize their experience promises to be an important venue for applied research. Certainly, diverse structures and functioning should arise for divergent people, the caveat is to know to what extent they impact superior cognitive processes.

Moreover, this study was framed in the cognitive unconscious level of cognition, as stipulated by Lakoff and Johnson (1999), where it is believed that at least 95% of the cognitive processes occur

(Dehaene, 2014). New research efforts could be directed to modelling the interconnections of cognitive processes that occur in the cognitive unconscious level (e.g., the iovis) in the phenomenological and the neural levels in both prototypical and neurodivergent populations. What is more, another yet more prominent area of study of the iovis is the field of artificial intelligence (AI) since it may question traditional notions of consciousness and ethics (Dennett, 2023) and provide understanding of what the algorithms process as objective, subjective, and institution-based ways of knowing.

Finally, by providing the structure and the functioning of the iovis as an embodied cognitive process that shapes concepts of objectivity, subjectivity and institutions, some questions remained unsolved. If a passage from perception to cognition is aided by embodied mechanisms, as we believe along with other scholars (Gärdenfors, 2014; Shapiro, 2019; Spackman & Yanchar, 2014; Wen & Jiang, 2021), there is still the need to clarify what mechanisms help individuals in translating highly abstract concepts that may not depend on metaphors and embodied expressions/experiences (Gärdenfors, 2014). Since Lakoff and Johnson's (1999) theory of the embodied mind admits that some portion of language may be open to other forms of literal construction, it would be worth investigating what specific mechanisms can challenge the empirical evidence and the theoretical model we provide through the iovis; a discussion of that caliber deserves attention and could help in advancing the embodied realm in a number of unforeseen directions, some of which could be the embodied language learning scope (Jusslin et al., 2022; Nathan, 2022) or the interventions (trials and trainings) for the language pathologies we briefly reviewed above (Bocanegra et al., 2015; De Vega, 2021).

Conflict of Interest

The authors declare no conflict of interest.

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Acknowledgments

References

Aristotle (éd. 1967). *Rhétorique 1* (Transl. M. Dufour). Les Belles Lettres.

Aristotle (éd. 1983). *Éthique à Nicomaque* (Transl. J. Tricot). Vrin.

Alonso, L. (2007). Sujeto y discurso: el lugar de la entrevista abierta en las prácticas de la sociología cualitativa. In J. Delgado and J. Gutiérrez (Eds.), *Métodos y técnicas cualitativas de investigación en ciencias sociales* (pp. 225–238). Síntesis.

Aarsand, L., & Aarsand, P. (2018). Framing and switches at the outset of qualitative research interviews. *Qualitative Research, 19,* 635-652. https://doi.org/10.1177/1468794118816623

Astington, J. & Baird, J. (2005). *Why language matters for theory of mind.* Oxford University Press. https://doi.org/10.1093/acprof:oso/9780195159912.001.0001

Barsalou, L. (1999). Perceptual symbol systems. *Behavioural and Brain Sciences 22*(4), 577–660. https://doi.org/10.1017/s0140525x99002149

Berrendonner, A. (1981). *Éléments de pragmatique linguistique.* Minuit.

Bocanegra, Y., García, A., Pineda, D., Buriticá, O., Villegas, A., Lopera, F., Gómez, D., Gómez-Arias, C., Cardona, J., Trujillo, N., & Ibáñez, A. (2015). Syntax, action verbs, action semantics, and object semantics in Parkinson's disease: Dissociability, progression, and executive influences. *Cortex, 69,* 237–254. https://doi.org/10.1016/j.cortex.2015.05.022

Brems, L. (2021). Intersubjectivity and intersubjectification. In W. Xu & J. Taylor (Eds.), *The Routledge handbook of cognitive linguistics* (pp. 161–172). Taylor & Francis Group. https://doi.org/10.4324/9781351034708-22

Cifuentes, P. (2012). La semántica conceptual. In I. Ibarretxe-Antuñano & J. Valenzuela (2012) (Eds.), *Lingüística cognitiva.* Anthropos.

Corey, J., & Costa, A. (2015). The foreign language effect on moral decisions. *Ciencia Cognitiva, 9*(3), 57–60. https://www.cienciacognitiva.org/?p=1147

Croft, W. (2009). Toward a social cognitive linguistics. In V. Evans, & S. Pourcel (Eds.), *New directions in cognitive linguistics* (pp. 395–420). John Benjamins. https://doi.org/10.1075/hcp.24.25cro

Damasio, A. (2018). *The strange order of things.* Pantheon Books.

Damasio, A. Tranel, D., & Damasio, H. (1991). Somatic markers and the guidance of behaviour: theory and preliminary testing. In H. S. Levin, H. M. Eisenberg, & A. L. Benton (Eds.), *Frontal lobe function and dysfunction* (pp. 217–229). Oxford University Press. https://doi.org/10.1093/oso/9780195062847.003.0011

Dehaene, S. (2014). *Consciousness and the brain: Deciphering how the brain codes our thoughts.* Viking Penguin.

Dennett, D. (2023). *I've been thinking.* Random House.

Deslauriers, J. (2019). *Investigación cualitativa. Guía práctica.* Alma Mater.

De Vega, M. (2021). Revisitando la corporeidad del lenguaje narrativo [Revisiting the embodiment of narrative language]. *Revista Signos. Estudios de lingüística, 54*(107), 985–1003. https://doi.org/10.4067/S0718-09342021000300985

Ellis, N. (2019). Essentials of a theory of language cognition. *The Modern Language Journal, 103*(Suppl. 1), 39–60. https://doi.org/10.1111/modl.12532

Evans, V. (2004). *Language and time. A cognitive linguistics approach.* Cambridge University Press.

Evans, V., & Green, M. (Eds.). (2006). *Cognitive linguistics: An introduction.* LEA & Edinburgh University Press.

Evans, V., Bergen, B., & Zinken, J. (Eds.). (2007). *The cognitive linguistics reader.* Equinox.

Fauconnier, G., & Turner, M. (2002). *The way we think: Conceptual blending and the mind's hidden complexities.* Basic Books.

Firth, A. (2010). Etnometodología (Transl. Teresa E. Cadavid). *Discurso & Sociedad, 4*(3), 597–614. https://doi.org/10.14198/dissoc.4.3.6

Fillmore, C. (1982). Frame semantics. *Linguistics in the morning calm* (Selected Papers from SICOL-1981). Hanshin Publishing Company.

22

Fodor, J. (1983). *The modularity of mind*. MIT Press.

Francis, D., & Hester, S. (2004). *An invitation to ethnomethodology*. Sage.

Gall, M., Borg, W. & Gall, J. (1996). *Educational research. An introduction* (6th Ed.). Longman.

Gärdenfors, P. (2000). *Conceptual spaces*. MIT Press. https://doi.org/10.7551/mitpress/2076.001.0001

Gärdenfors, P. (2004). Conceptual spaces as a framework for knowledge representation. *Behavioral and Brain Sciences, 27*(3), 403. https://doi.org/10.1017/S0140525X04280098

Gärdenfors, P. (2014). *The geometry of meaning: Semantics based on conceptual spaces*. MIT Press. https://doi.org/10.7551/mitpress/9629.001.0001

Geeraerts D., & Cuykens, H. (Eds.). (2007). *The Oxford handbook of cognitive linguistics*. Oxford University Press.

Gibbs, R. (2007). Why cognitive linguists should care more about empirical methods. In V. Evans, B, Bergen, & J. Zinken (Eds.), *The cognitive linguistics reader* (pp. 40–56). Equinox. https://doi.org/10.1075/hcp.18.06gib

Giraldo, L., Restrepo, F., & Arboleda, V. (2018). Trastorno del espectro autista, electroencefalografía y neuronas espejo. *Acta Neurol Colomb, 34*(3), 215–222. https://doi.org/10.22379/24224022215

Givón, T. (1994). *Voice and inversion*. John Benjamins. https://doi.org/10.1075/tsl.28

Goldman, A. (2012). A moderate approach to embodied cognitive science. *Rev. Phil. Psych, 3,* 71–88. https://doi.org/10.1007/s13164-012-0089-0

Greene, J., Sommerville, R., Nystrom, L., Darley, J., & Cohen, J. (2001). An fMRI investigation of emotional engagement in moral judgment. *Science, (293)*, 2105–2108. https://doi.org/10.1126/science.1062872

Gosselin, L. (2005). *Temporalité et modalité* (postface by B. Victorri), Duculot-de Boeck. https://doi.org/10.3917/dbu.gosse.2005.01

Gosselin, L. (2010). *Les modalités en français. La validation des représentations* (coll. Études Chronos). Rodopi. https://doi.org/10.1163/9789042027572

Gosselin, L. (2018). Quand nommer, c'est juger. In C. Schnedecker, & W. Mihatsch (Eds.), *Les noms d'humains–Théorie, méthodologie, classification* (pp. 44–101). De Gruyter. https://doi.org/10.1515/9783110586169-002

Hume, D. (2000 [1739–1740]). *A treatise on human nature.* (Edited by D. F. Norton & M. J. Norton). Oxford University Press.

Jaramillo, J. (2013). Las teorías descriptivas de la referencia de Strawson y Searle. Dos críticas a las teorías del sinsentido. *Discusiones Filosóficas, 14*(23), 155–177. https://revistasojs.ucaldas.edu.co/index.php/discusionesfilosoficas/article/view/740

Johnson, M. (2005). The philosophical significance of image schemas. In B. Hampe (Ed.), *From perception to meaning. Image schemas in cognitive linguistics* (pp. 15–31). Mouton de Gruyter. https://doi.org/10.1515/9783110197532.1.15

Garnham, A., & Oakhill, J. (Eds.). (1996). *Mental models in cognitive science. Essays in honour of Phil Johnson-Laird.* Psychology Press, Taylor & Francis Group.

Jusslin, S., Korpinen, K., Lilja, N., Martin, R., Lehtinen-Schnabel, J., & Anttila, E. (2022). Embodied learning and teaching approaches in language education: A mixed studies review. *Educational Research Review, 37,* 100480, 1–21. https://doi.org/10.1016/j.edurev.2022.100480

Kamp, C. F., Sperlich, B., & Holmberg, H.-C. (2014). Exercise reduces the symptoms of attention-deficit/hyperactivity disorder and improves social behaviour, motor skills, strength and neuropsychological parameters. *Acta Paediatr, 103,* 709–714. https://doi.org/10.1111/apa.12628

Knobe, J. (2010). Person as scientist, person as moralist. *Behavioural and Brain Sciences, 33*(4), 329–365. https://doi.org/10.1017/s0140525x10000907

Laitinen, A. (2014). Against representations with two directions of fit. *Phenomenology and the Cognitive Sciences, 13,* 179–199. https://doi.org/10.1007/s11097-013-9328-9

Lakoff, G. (2009). *The neural theory of metaphor.* University of California at Berkeley. https://doi.org/10.2139/ssrn.1437794

Lakoff, G. (2016). Language and emotion. *Emotion Review, 8*(3), 269–273. https://doi.org/10.1177/1754073915595097

Lakoff, G. & Johnson, M. (1999). *Philosophy in the flesh: The embodied mind and its challenge to Western thought.* Basic Books.

Langacker, R. (2008). *Cognitive grammar, a basic introduction.* Oxford University Press. https://doi.org/10.1093/acprof:oso/9780195331967.001.0001

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Levine, R. & Norenzayan, A. (1999). The pace of life in 31 countries. *Journal of Cross-Cultural Psychology, 30*(2), 178–205. https://doi.org/10.1177/0022022199030002003

Maturana, H. & Varela, F. (2004). *De máquinas y seres vivos. Autopoiesis: la organización de lo vivo*. Lumen.

Nathan, M. J. (2022). *Foundations of embodied learning. A paradigm of education*. Taylor & Francis. https://doi.org/10.4324/9780429329098

Pulvermüller, F., Cook, C., & Hauk, O. (2012). Inflection in action: Semantic motor system activation to noun- and verb-containing phrases is modulated by the presence of overt grammatical markers. *Neuroimage, 60*(2), 1367–1379. https://doi.org/10.1016/j.neuroimage.2011.12.020

Redolar, D. (Ed.). (2014). *Neurociencia cognitiva*. Panamericana.

Restrepo-Rodas, J., Moreno, L., Fonseca, J., Vera, A., & Quiroz, D. (2021). Moral reasoning and foreign languages: A cognitive and linguistic study in bilingual teachers. In N. Loaiza, A. Botero, M. Rolong, & M. Zapata (Eds.), *Research commitments for a social change* (pp. 249–268). REDIPE. https://editorial.redipe.org/index.php/1/catalog/view/70/126/1506

Restrepo-Rodas, J., Niño-Buitrago, L., & Suárez, M. (2022). Naturalizing morality: From alethic to deontic and axiological values; the case of *Tocar*, a Colombian Spanish verb. *Revista de Humanidades de Valparaiso, 20,* 77–99. https://doi.org/10.22370/rhv2022iss20pp77-99

Restrepo-Rodas, J. (2024). *Linguistic modalities' interaction with theory of mind and moral cognition*. Unpublished doctoral thesis at Autonomous University of Manizales, Manizales, Colombia.

Restrepo-Rodas, J., Niño-Buitrago, L., & Robledo-Castro, C. (2024). Elemental intercultural imprint: Towards a neurocognitive model of interculturality through the naturalization of philosophical concepts. *Ánfora, 31*(57), 269–297. https://doi.org/10.30854/anf.v31n57.2024.1096

Restrepo-Rodas, J., Niño-Buitrago, L., Suárez, M., & Rodríguez, A. (2025). Embodied underpinnings of the direction of fit image schema (DoFIS). Forthcoming in *Cognitive Linguistic Studies*.

Rodríguez, A. (2015). Searle y la posibilidad de derivar un "debe" de un "es". *Escritos, 23*(50), 213–229. http://www.scielo.org.co/pdf/esupb/v23n50/v23n50a10.pdf

Rodríguez, A. (2018). *Naturaleza biopragmática de la moral. Lenguaje y mente, condiciones necesarias de la institución moral*. UAM, Editorial Universidad Pontificia Bolivariana.

Rodríguez, A. (2020). Objetividad de los juicios morales. Una revisión desde el pragmatismo lingüístico. *Guillermo de Ockham, 18*(1), 19–31. http://www.scielo.org.co/scielo.php?script=sci_arttext&pid=S1794-192X2020000100019

Rohrer, T. (2007). Embodiment and experientialism. In D. Geerarts, & H. Cuykens (Eds.), *The Oxford handbook of cognitive linguistics* (pp 25-47). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780199738632.001.0001

Rizzolatti, G., & Rozzi, S. (2016). Motor cortex and mirror system in monkeys and humans. In G. Hickok, & S. Small (Eds.), *Biology of language* (pp. 59–72). Academic Press, Elsevier. https://doi.org/10.1016/B978-0-12-407794-2.00006-7

Searle, J. R. (1964). How to derive 'ought' from 'is'. *Philosophical Review, 73*, 43–58. https://doi.org/10.2307/2183201

Shapiro, L. (2019). *Embodied cognition* (2nd Ed.). Routledge, Taylor & Francis. https://doi.org/10.4324/9781315180380

Sinha, C. (2007). Cognitive linguistics, psychology and cognitive science. In D. Geeraerts & H. Cuykens (Eds.), *The Oxford handbook of cognitive linguistics* (pp. 1266–1294). Oxford University Press.

Spackman, J. & Yanchar, S. (2014). Embodied cognition, representationalism, and mechanism: A review and analysis. *Journal for the Theory of Social Behaviour, 44*(1). https://doi.org/10.1111/jtsb.12028

Talmy, L. (2000). *Toward a cognitive semantics* (2 vols.). MIT Press. https://doi.org/10.7551/mitpress/6847.001.0001

Talmy, L. (2007). Attention phenomena. In D. Geeraerts & H. Cuykens (Eds.), *The Oxford handbook of cognitive linguistics* (pp. 264–293). Oxford University Press.

Tay, D. (2021). Image schemas. In W. Xu and J. Taylor (Eds.), *The Routledge handbook of cognitive linguistics* (pp. 161–172). Taylor & Francis Group. https://doi.org/10.4324/9781351034708-12

Van Dijk, T. (2014). *Discourse and knowledge, A sociocognitive approach*. Cambridge University Press. https://doi.org/10.1017/CBO9781107775404

Wen, X. & Jiang, C. (2021). Embodiment. In X. Wen and J. Taylor (Eds.), *The Routledge handbook of cognitive*

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linguistics (pp. 145–160). Routledge. https://doi.org/10.4324/9781351034708-11

Wolff, P. (2007). Representing causation. *Journal of Experimental Psychology, 136*, 82–111. https://doi.org/10.1037/0096-3445.136.1.82

Wolff, P. (2008). Dynamics and the perception of causal events. In T. Shipley & J. Zacks (Eds.), *Understanding events: How humans see, represent, and act on events* (pp. 555–587). Oxford University Press. https://doi.org/10.1093/acprof:oso/9780195188370.003.0023

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