

## Is *Container* a Natural and Embodied Image Schema? A Developmental, Pragmatic, and Cultural Proposal

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### Abstract

Conceptual metaphor theory showed, from *embodiment*, the importance of metaphor as a cognitive process. This influential theory assumes the existence of primitive but powerful mental structures called *image schemas*. In this paper, we conduct a critical inquiry about these structures from the developmental perspective of the *pragmatics of the object* and show they have serious problems. Taking the CONTAINER image schema as a case, we discuss the plausibility of image schemas in early childhood. We suggest that children do not interact with objects as if a basic and generic CONTAINER cognitive structure preexisted. Instead, in everyday life, they use “container” objects to fulfill very different functions. As *object function* is construed by children’s participation in triadic child-adult-object experiences through semiotic mediation, we propose image schemas are not natural or direct, do not exist in early childhood, and are a developmental, pragmatic, and cultural product. As empirical illustration, we analyze a child-mother-objects interaction at home.

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Within cognitive psychology, the conceptual metaphor theory (CMT) by Lakoff and Johnson [1980a/2003, 1999] constitutes a paradigm of great importance to study metaphorical thought. It proposes that metaphor is a cognitive process that allows us to understand abstract domains of thought from more basic domains and not only a linguistic, rhetorical, and ornamental resource. The theoretical perspective of these

authors rests on the existence of basic *image schemas* that constitute a requirement for metaphorical projections [for more on image schemas, see Cienki, 2013; Gibbs & Colston, 1995; Lakoff, 1987; Mandler, 1992, 2005; Mandler & Pagán Cánovas, 2014].

In virtue of the epistemological importance of these schemas, in this article we propose, first, to conduct a critical and in-depth inquiry of them. After that, we will argue from the sociocultural theoretical framework of the *pragmatics of the object* (from the Geneva School) [Rodríguez & Moro, 1998, 1999] that the characterization that Lakoff and Johnson [1980a/2003, 1999] make of image schemas has some problems if evaluated from a developmental point of view. As a solution to those problems, we propose: (1) that generic image schemas may constitute a late developmental achievement and are not an a priori condition (i.e., children construct them during ontogenesis) and (2) that the ontogenetic precursor of image schemas is a set of uses and gestures that subjects perform with particular objects, in triadic educative and communicative adult-object-child interactions. Underneath these uses and gestures underlie particular semiotic systems, previously explored from the *pragmatics of the object* (Table 1). Both hypotheses are discussed in relation to the image schema CONTAINER.

Likewise, as an empirical illustration, we will present a quantitative and qualitative analysis of a 23-min video in which a mother interacts with her child (17 months and 6 days of age) in their home around different container objects. This video is part of a wider longitudinal study that seeks to inquire into the ontogenetic origins of metaphorical thought from a sociocultural perspective. What the analysis makes evident is that, in real life, subjects do not interact with a universal concept of container (i.e., “ideal” CONTAINER), but with *specific container objects* that possess public rules of use which enable certain actions and not others. In everyday life, containers with which children interact are very diverse, and *do not possess identical complexity of use or function*. Thus, talking about the existence of ideal CONTAINERS does not coincide with empirical findings on the developmental level.

Lastly, we argue that the developmental and cultural point of view of the *pragmatics of the object* is critical to better understand the dynamics of metaphorical thought and its ontogenetic precursors. We believe these do not only involve the *direct and embodied subject-environment interactions* [see Johnson, 1987; Lakoff & Johnson, 1999] but, fundamentally, the reconstructive history of the semiotic relations that constitute the normative and public framework of the material world, and the culturally mediated appropriation that children make of semiotic systems [see Alessandroni, 2016].

### **The Conceptual Metaphor Theory by Lakoff and Johnson**

For over 30 years, the CMT proposed by Lakoff and Johnson [1980a/2003, 1980b, 1999] has been one of the most widely used paradigms to research metaphorical thought. The theoretical perspective of these authors challenges traditional philosophical and psychological theories. It proposes that metaphors should not be understood as ornaments of language or rhetorical means produced by poetic imagination to provide esthetic elements to discourse or to confuse other interlocutors with linguistic whirls that detract the literal linguistic referentiality relations. On the contrary, they state that linguistic metaphors are surface realizations of projective cognitive processes by which a set of information is imported from a known domain to an ab-

**Table 1.** Observation categories, inclusion criteria, and examples – uses and communicative mediators of uses

Child	Mother
Uses of objects	Communicative mediators of uses
<p><i>A. Noncanonical uses:</i> uses of the object according to what they physically allow and not according to their cultural function (i.e., shaking, biting or sucking). Examples:</p> <ol style="list-style-type: none"> <li>i. flipping the bucket and pushing it</li> <li>ii. putting both hands in the bucket without doing anything else</li> </ol>	<p><i>C. Canonical demonstrations:</i> the adult communicates the canonical function of an object to the child. Examples:</p> <ol style="list-style-type: none"> <li>i. unlocking and opening/closing the toy box</li> <li>ii. searching objects inside the toy box</li> <li>iii. taking/storing objects from/in the toy box or the bucket</li> </ol>
<p><i>B. Protocanonical uses:</i> uses more directed than the noncanonical ones. They announce the appearance of canonical uses. Examples:</p> <ol style="list-style-type: none"> <li>i. accompanying the opening of the toy box initiated by the mother</li> <li>ii. trying to put an oval piece into the assemblable toy, without completely achieving it</li> </ol>	<p><i>D. Rhythmic-sonorous demonstrations:</i> the adult communicates to the child a rhythmic-sonorous function that can be applied to an object. Examples:</p> <ol style="list-style-type: none"> <li>i. playing a maraca in front of the child</li> <li>ii. making a tambourine vibrate in front of the child</li> </ol>
<p><i>C. Canonical uses:</i> uses of the objects according to the function they have in everyday life. Examples:</p> <ol style="list-style-type: none"> <li>i. searching objects in the toy box</li> <li>ii. taking/storing objects from/in the toy box or the bucket</li> </ol>	<p><i>E. Metacanonical demonstrations:</i> the adult communicates to the child a metacanonical function that can be applied to an object. Example:</p> <ol style="list-style-type: none"> <li>i. putting the yellow tube into the washing liquid dosing ball</li> </ol>
<p><i>D. Rhythmic-sonorous uses:</i> uses of objects that exhibit rhythmic and sonorous components. Examples:</p> <ol style="list-style-type: none"> <li>i. shaking the bucket when it is full of toy cubes</li> <li>ii. using the replica adjustable wrench in a percussive way on the toy box lid</li> </ol>	<p><i>F. Symbolic demonstrations:</i> the adult communicates a symbolic use of an object to the child. Examples:</p> <ol style="list-style-type: none"> <li>i. putting the bucket in the mouth to use it as a megaphone</li> <li>ii. moving a plush bird as if it was flying towards the child</li> </ol>
<p><i>E. Metacanonical uses:</i> creative uses of objects that do not fit their conventional function in everyday life, but exhibit effectivity. Example:</p> <ol style="list-style-type: none"> <li>i. putting the yellow tube into the washing liquid dosing ball</li> </ol>	
<p><i>F. Symbolic uses:</i> uses of the objects to represent something absent. Example:</p> <ol style="list-style-type: none"> <li>i. putting the bucket in the mouth of the mother for her to use is as a megaphone</li> </ol>	
<p>Research from the <i>pragmatics of the object</i> about each category. A, B, C: Rodríguez [2006, 2007, 2012a]; Rodríguez &amp; Moro [1998, 1999, 2008]. D: Moreno-Núñez, Rodríguez, &amp; Del Olmo [2015]; Rodríguez et al. [in press]. E: Rodríguez et al. [in press]. F: Cárdenas, Rodríguez, &amp; Palacios [2014]; Rodríguez &amp; Moro [2002]; Rodríguez et al., [2014]; Palacios &amp; Rodríguez [2015]; Palacios et al. [2016].</p>	

stract knowledge domain to ease its comprehension. Conceptual metaphors are, for Lakoff and Johnson [1980a/2003, 1980b, 1999], *cognitive mechanisms* that allow us to comprehend, in everyday life, abstract domains such as *importance* or *morality* in terms of more basic domains, usually sensorimotor ones.

For instance, through the conceptual metaphor TIME IS MOVEMENT we can comprehend temporality – an abstract dimension of our experience – in terms of characteristics of the physical domain. Thus, we assign the ability to move in space to different temporal events (*time-moving perspective*, i.e., “the exam date is getting closer”), or we spatialize and immobilize the events to move towards them (*ego-moving perspective*, i.e., “we are approaching the closing of the symposium”) [Boroditsky & Ramscar, 2002]. Lakoff and Johnson [1980a/2003, 1980b, 1999] also argue that our conceptual system is metaphorical. Thereby, a great part of human abstract concepts is structured in metaphorical terms. This implies that the way in which we think, experiment, and act in the world is metaphorically determined.

In agreement with the embodiment paradigm, stating that metaphor is based on basic sensorimotor experiences that allow us to structure abstract knowledge domains, Lakoff and Johnson adhere to the idea that metaphorical thought makes up a case of embodied cognitive process. From this naturalistic point of view coincident with some Piagetian proposals [Piaget, 1936/1981], complex psychological processes have an embodied base that defines its nature, because action and potentialities for action are constitutive of cognition. This tends to invalidate the classical cognitivist assertion that our representations are independent from the processes that act upon them (e.g., action) [for an epistemological analysis of the cognitivist program, see Rivière, 1987] and to raise the explicative status of our bodies in cognition [Johnson, 2007]. Body experience provides the prereflexive foundations of meaning that allow us to think in an abstract way and to satisfactorily perform in relation to human symbolic interaction, expression, and communication [Johnson, 2008].

As we have written elsewhere [Alessandroni, 2015], an interesting side of this hypothesis is that enactive performances of our bodies in the world and complex cognitive processes (i.e., language or metaphorical thought) are considered phenomena of different orders, but are intimately linked by a relation of *supervenience-continuity*. Supervenience refers to the fact that if  $\alpha$  is the set of properties of human action in the world, and  $\beta$  the set of properties of complex cognitive processes, it cannot be the case that  $\alpha$  differs and  $\beta$  does not. In contrast, orthodox accounts of cognition state that complex cognitive processes operate with amodal representations independent of action. Continuity refers to the fact that the subject-world embodied interaction is a condition of possibility of the gradual constructive process that enables the emergence of complex forms of cognition. In this way, embodied theories of mind have contributed to consolidate a broader sense of *metaphor*, now conceived as a process that permeates our thinking, our action, and all our linguistic expressions.

## Image Schemas

Within CMT, one of the most important concepts is, without a doubt, that of image schema. It constitutes the condition of a possibility of the mappings that characterize metaphorical projections. Image schemas are embodied basic structures, dependent on action, that allow us to structure our experience on the levels of corpo-

real perception and movement, to understand abstract sides of reality, to make meaning attributions, and to guide our reasoning about the world. Some examples of image schemas are: OBJECT, CONTAINER, SOURCE-PATH-GOAL, BALANCE, CYCLE, FORCE, UP-DOWN, CONTACT, CENTER-PERIPHERY, and ORIENTATION [Johnson, 1987; Johnson & Lakoff, 1992; Lakoff, 1987].

In this theory, metaphorical projections can be understood as mechanisms that extend image schemas during conceptualization and abstraction acts [Lakoff, 1990, p. 40]. This means that any possibility of abstract thinking is founded in embodied structures dependent on individual action. Given that the unfolding of our argument proceeds from the developmental consideration of image schemas, we propose a detailed characterization of them beginning with the most significant contributions Lakoff and Johnson have made. To preserve the epistemological sense of the term, we have resorted to a set of quotes that circumscribe their most important conceptual frontiers.

Image schemas:

- Are *primitive, elementary, recurrent* and *direct*. They are basic, primitive [Johnson & Lakoff, 1992, p. 3; Lakoff & Johnson, 1980a/2003, p. 253], obvious [Johnson, 2007, p. 137], and prelinguistic schematic mental images. They *directly* emerge from our recurrent action in the world, that is, they are a product of the “direct embodiment of reason” [Lakoff & Johnson, 1999, p. 43]
- Are *physical* and *experiential*. They are structures of physical nature [Lakoff & Johnson, 1980a/2003, p. 14], that emerge “through perception, manipulation, movement, and conscious and unconscious acts of organizing and unifying” [Johnson, 1989, p. 111]
- Are *conceptual* and act as *mediators* between the embodied and abstract dimensions. They are cases of concepts [Lakoff & Johnson, 1999, p. 43] of intermediate complexity, that is, neither abstract propositions nor concrete images [Johnson, 1989, p. 113]. These primitive concepts make up a meaning level, arise in all natural languages, and – in a sense similar to that of Kant when referring to schemas – mediate between the embodied dimension and complex concepts expressed by linguistic structures [Lakoff, 2014, p. 5]
- Are *topological* and enable certain *logics*. Image schemas are structures composed by a scenario and other elements, plus a set of relations between them. In this way, “elementary schemas have a part-whole structure, with the entire schema as the whole and the semantic roles as the parts” [Lakoff, 2014, p. 5]. These structures have built-in logics that derive from the set of intercomponent relations [Lakoff, 2014, p. 31]
- Are *unconscious mechanisms*, eminently *imaginative*. They are elements of the cognitive unconscious [Lakoff & Johnson, 1999, p. 117] that act as “hidden conceptual mechanisms” [Lakoff & Johnson, 1999, p. 509]. An image schema “typically operates beneath the level of our conscious awareness, although it also plays a role in our discrimination of the contours of our bodily orientation and experience” [Johnson, 2007, p. 139]
- Possess a *neural base*. As part of the *neural embodiment* research program [Lakoff, 2008; Lakoff & Johnson, 1999, p. 36], it has been proposed that image schemas can be explained, in part, by “topographic maps and neural gating” [Lakoff & Johnson, 1999, p. 113] and that they possess particular properties that arise from the biological structure of the human brain [Johnson & Lakoff, 1992, p. 4]

Likewise, in relation to their function, image schemas:

- Are the *basis of inferences and abstract reasoning* since, because of their *embodied logic* [Johnson, 2007], they define “a wide range of general inference patterns characterizing all forms of causal, spatial and event based reasoning” [Gallese & Lakoff, 2005, p. 471]. Abstract thought could be characterized as a metaphorization of image-schema-based reasoning [Lakoff, 1990, p. 39; Johnson, 1989, p. 115]
- Are the *basis of the structure of our perceptions and actions*. Given that bodily movement is a basic and recurrent form of action in the world, image schemas are used to order and unify our perceptions and characterize the aspectual structure we “find” in actions and events [Johnson, 1989, p. 113]. For example, “when we understand a bee as being in the garden, we are imposing an imaginative container structure on the garden, with the bee inside the container” [Lakoff & Johnson, 1999, p. 117]
- *They are directly linked to language*. Image schemas behave as “structures that link sensorimotor experiences to conceptualization and language” [Johnson, 2007, p. 144]. So, “although they are preverbal, they play a major role in the syntax, semantics, and pragmatics of natural language. They lie at the heart of meaning, and they underlie language, abstract reasoning, and all forms of symbolic interaction” [Johnson, 2007, p. 145]

## Problems Posed by Image Schemas

### *The Problem of the Genesis of Image Schemas*

As we have noted, CMT is based in a nondualistic ontology that highlights the value of the embodied dimension (the *organism-environment coupling*) in the construction of complex psychological functions and abstract types of thought. This perspective, which is opposed to the dominant objectivist philosophical thought supported by the mind/body dualism [Lakoff & Johnson, 1999], entails, as an element of its hard core, a naturalistic bet: *natura non facit saltus*. In the words of Johnson, “it is a nondualistic ontology built around the principle of continuity, according to which there are no ontological ruptures or gaps between different levels of complexity within an organism” [Johnson, 2007, p. 145]. For CMT, there is continuity between image schemas, linguistic metaphorical expressions and abstract thought. However, an issue that the authors do not address carefully is the ontogenesis of this continuous human conceptual system, based on nonqualitative degree differences (i.e., “How *natura non facit saltus*?”). Thus, even when it is clear that image schemas are changed by enactive experience (they are dynamic), it is not explicit whether they are innate or a developmental achievement (and, if the latter were the case, in which precise developmental moment they emerge, or how they relate with other psychological constructions).

In *The Meaning of the Body* [Johnson, 2007], for example, Johnson argues that, “in addition to the evidence from the neurosciences, there is a growing body of research from developmental psychology suggesting that infants come into the world with capacities for experiencing image-schematic structures” (p. 143). In this way, image schemas would seem to be part of the innate skillful equipment with which babies come into the world and, thus, to be totally disconnected (at least in the begin-

ning) from interaction with the environment and with other human beings. This idea, close to the notion of *core knowledge* sustained by advocates of the *competent infant paradigm* [see, for example, Baillargeon, 1987; Slater, 1998; Spelke, 1990, 2000], is in contrast to classical works in developmental psychology, such as those by Wallon on the body and its foundational role in the psychological construction and the encounter with others [for a discussion, see Rodríguez, Benassi, Estrada, & Alessandroni, 2017].

Nevertheless, in the same book, Johnson [2007] stated that “infants have primitive cognitive capacities that, through interaction with the world and other people, become functioning minds” (p. 151), and that “the cross-modal basis for many of our image schemas requires epigenetic stimulation of the kind presented by human parents” [Johnson, 2007, p. 150]. Here, image schemas would not be innate cognitive elements but primitive structures that can be activated by stimulation provided by basic interactions with the world and others. If this were the case, it would be necessary to set forth a developmental perspective about them.

However, taking this developmental perspective could involve difficulties, depending on how image schemas are understood. For instance, it has been noticed that, within CMT, the use of the concept of image schema is usually negligent and naïve [Minervino, 2007, p. 156]. As even Dewell [2005] writes, as an advocator of image schemas, the static definition of these schemas commonly accepted within cognitive linguistics lacks the movement and dynamism of children’s actions in the world, being abstracted of its functional aspects. The disconnection between the description of cognitive processes and development affects not only image schemas or CMT. As Martí [2017] states as a developmental psychologist, this disconnection can be found in most of the studies carried out from the embodiment paradigm “that seek bodily origins of knowledge (similar to those that seek the innate core of knowledge), but which do not address how knowledge changes with development” [Martí, 2017, p. 8]. Because of that, the elucidation of the ontogenetic trajectory of image schemas (the question about their origins and development) and the whole human conceptual system is a legitimate topic of inquiry [Lakoff, 1994, p. 89; Martí, 2017; Johnson, 2007].

### *The Problem of the Emergence of Conventions*

If the previous problem is a possible route of inquiry that could complement current knowledge about image schemas, the problem to which we now refer has a greater degree of epistemological dissonance. For Lakoff and Johnson, image schemas are primitive structures that depend on our embodied nature and that emerge directly from subject-environment interactions. But, if we accept this, then how do image schemas successfully connect with a highly complex and cultural semiotic system as language?

This problem does not constitute an isolated case within the history of ideas. In *The Concept of Mind*, for instance, the philosopher Gilbert Ryle [1949/2005] analyzed the intellectualist tradition that asserts that intelligence is a special faculty exercised through the observation of propositions “in the mind.” In a famous argument, the author refers to the *mediator problem*. If we accept that the intelligent performance of an ability requires the observation of regulative propositions “in the mind,” it becomes necessary to propose the existence of some mediator that can link the observed

propositions with the performed actions. This mediator, by definition, must be able to influence action, and to be influenced by propositions. And given that both prerequisites are metaphysically incompatible between them, the mediator has to be a compound of two parts (one linked to the rational sphere and the other to the practical one) related to each other by another mediator that, for the same reasons sketched above, must possess a componential structure, whose cohesion factor will be a new bipartite mediator. It is, of course, an *ad infinitum* regressive argument. The problem of the mediator also affects other theoretical developments, such as Vygotskian statements on psychological processes [Vygotsky, 1931/1966; 1934/1987]<sup>1</sup>, or the Cartesian considerations on the pineal gland as the “seat of the soul” [Lewis, 1969] and the dual character of emotions [for a criticism, see Vygotsky, 1933/2004].

When it comes to the relationship between image schemas and language, the dilemma is exactly the same: given the characteristics of both things, it becomes necessary to pose a bipartite mediator, half-embodied and half-conventional (and, thus, cultural). But, given the dual character of the mediator, it will also need a mediator of the mediator (and so on to infinity). There seems to be only two answers to the problem: (a) either the conventional aspects of linguistic communication constitute emergent and spontaneous properties that appear *ex nihilo* from certain embodied recurrent patterns, or (b) it is necessary to explain the constructive trajectory of the cultural and public conventions that allow, eventually, for the existence of public agreement degrees within linguistic communication. That is, to recognize that there can exist conventions in semiotic systems earlier to language, conventions upon which the latter is based.

The second answer, to which we adhere, proposes to consider image-schemas as a cultural product and not as a natural consequence of recurrent action in the world. This cultural perspective has found, in the last few years, certain acceptance by members of the academic community [Booth, 2016; Turner, 2011]. For example, Mark Turner – who wrote with Lakoff a well-known book about poetic metaphors [Lakoff & Turner, 1989] – argues in a recent chapter [Turner, 2011] that although embodiment is attractive, it is insufficient to explain human cognition: “All mammals have embodied minds, but only cognitively modern human beings have robust culture (...) How then do we explain the origins and development of culture? Pointing to embodied minds does not point us to an answer” [Turner, 2011, p. 14]. This insufficiency of considering a solitary individual acting in the world as the basis of cognitive achievements has also been emphasized, previously, to criticize the Piagetian perspective about cognitive and language development [see discussion in Rodríguez, 2006]. Thus, from the *pragmatics of the object*, it has been shown that the adaptive and biological matrix on which Piaget resorts to conceptualize intelligence silences the importance of culture and the role that social interactions have in the construction of thought (Rodríguez & Moro, 1999, p. 26).

Embodiment, meanwhile, seems to replicate this explanatory and reductionist strategy not considering, in a constitutive way, culture or communicative exchanges. The conditions of access to the cultural level of explanation are the rupture of the dy-

<sup>1</sup> Within the theoretical developments of Vygotsky, the problem is related to the relation between lower and higher psychological functions: How is it possible that cultural “higher psychological functions” emerge from a set of natural and biological “lower psychological functions”? [For a discussion, see Rodríguez, 2006; Rodríguez & Moro, 1999; Martí, 2017].



adic and self-sufficient organism-environment coupling embodiment proposes, and the inclusion of communication and culture from the beginning of ontogenetic trajectories. As Johnson [2007] himself would point out, “a fully adequate treatment of the social and cultural dimensions of thought would require substantially more evidence and analysis” [Johnson, 2007, p. 151]. To provide new evidence about the cultural character of cognitive achievements within development, we present, next, a discussion around the CONTAINER image schema from the *pragmatics of the object* perspective.

#### *A Note about the Structure and Origin of the CONTAINER Image Schema*

Within the set of image schemas, CONTAINER is one of the most basic ones. Its comprehension is embodied and, according to Lakoff and Johnson [1999, p. 36], its experiential basis is constituted by activities such as *taking air in* and *emitting wastes*, and by concrete embodied experiences with different containers (objects and spaces, among others). This schema has its own built-in logic that emerges from the characteristics of the topological structure of the container: (a) an interior space, (b) some edges, and (c) an exterior space.

Curiously, some investigations from the competent infant paradigm claim, in line with the proposal of embodiment, the existence of an *early understanding of containment*. For example, according to Spelke, Breinlinger, Macomber, and Jacobson [1992], babies of 2 months of age know that wide objects cannot fit in a narrow container, and Hespos and Baillargeon [2001a] assert that, at 3 months, babies (a) have expectations about events involving containers, (b) know that containers must have an opening for something to go inside them, and (c) recognize that, if the container moves, the contents also move [see also Aguiar & Baillargeon, 1998; Casasola, Cohen, & Chiarello, 2003; Hespos & Baillargeon, 2001b; Hespos & vanMarle, 2012]. Further studies proposed there exists a *décalage* in infants' identification of the variable *height* in occlusion and containment events [Hespos & Baillargeon, 2006] that is modulated by the existence of a primary instance involving occlusion [Wang, 2011], and that the development of semantic and conceptual categories related to containment can be characterized as an extension of object core knowledge [Hespos & Spelke, 2007]. Lastly, other research has shown how experience enriches early containment understanding. Thus, Dejonckheere, Smitsman, and Verhofstadt-Denève [2005] showed that 9-month-olds need more visual cues than 12-month-olds to detect a violation in a containment event, and Rigney and Wang [2015] revealed that infants' categorical representation of containment does not exclude occlusion and support events until 11 months of age<sup>2</sup>.

In line with these investigations, Johnson proposed that “because we must constantly interact with containers of all shapes and sizes, we *naturally* learn the ‘logic’ of containment” [Johnson, 2007, p. 138, emphasis ours]. From the everyday individual interactions in the world with particular containers we get to form a basic concept of container that later, given its generic nature, can be physically instantiated in dif-

<sup>2</sup> Conversely, other works done in the 1980s from developmental psychology argue that children do not understand containment until 20 months of age [see, for example, Caron, Caron, & Antell, 1988; MacLean & Schuler, 1989].

ferent materialities alike: “Such a container schema can, however, be physically instantiated, either as a concrete object, like a room or a cup, or as bounded region in space, like a basketball court or a football field” [Lakoff & Johnson, 1999, p. 32].

How is the emergence of the schematic concept CONTAINER possible from experiences with objects? Johnson [2007] resorts to the idea of *affordance* proposed by Gibson [1966, 1977, 1979]. We form the CONTAINER schema from the relation between the interaction possibilities that objects themselves provide and the sensorimotor capacities of the organism in a determined environment. Objects, from this perspective, are known in a gradual, direct, and embodied way, before children acquire language [Johnson, 2007, p. 45]. Lastly, it is worth mentioning that, in the CMT, containers are not objects, but logical and conceptual schemas: “[containers] are not physical containers, but rather conceptualizations that we impose upon space” [Lakoff & Johnson, 1999, p. 380].

### The Pragmatics of the Object

The *pragmatics of the object* [see, for instance, Rodríguez & Moro, 1998, 1999; Rodríguez, 2006, 2007] is a paradigm within developmental psychology that analyzes how different uses of objects are constructed, and that proposes that communicative and educational processes are fundamental to the understanding of the ontogenetic trajectories by which infants signify the material world. From this point of view, the interaction of the child with other people plays a key role in the origin, organization, and construction of knowledge [Rodríguez et al., in press].

Thus, the Vygotskian idea that thought is rooted in communication and semiotic mediation is hereby extended to explain cognitive development in the first moments of ontogenesis<sup>3</sup>. Beyond posing that communication plays a fundamental role in cognitive development, the *pragmatics of the object* considers that communication does not happen in a void, but in a world in which there are objects. The world of meanings to which children gain access is culturally constructed and mediated by the structure and dynamics of the different functions and cultural uses that go across objects. This perspective overcomes the notion of *primary intersubjectivity* [Trevarthen, 1979; Trevarthen & Hubley, 1978], which supposes two early and incompatible types of subject-world relations: a direct and solitary cognitive contact between the subject and objects, and an innate social contact between the subject and other subjects, in which objects of the world have no importance [for a discussion, see Rodríguez et al., 2017].

In this theoretical framework, the object is no longer thought of as a set of physical properties, but as a key that enables triadic and functional forms of communication, even before objects become permanent by its function [Rodríguez, 2012a; Rodríguez et al., 2017]. Objects, besides being entities with certain physical characteristics, are *used* in everyday life in particular ways (they have culturally defined functions), and they are a constitutive part of the different human *forms of life* (“Lebensform”)

<sup>3</sup> This relation between communication and cognitive development in early childhood was neglected by Vygotsky, who proposed an excision between lower (natural, stripped of semiosis) and higher (cultural, related to language) psychological functions [Engeström & Sannino, 2012; Martí, 2017; Rodríguez, 2006; for a more general analysis about excision epistemologies in developmental psychology, see also Castorina, 2002].

[Winch, 1958/2012; Wittgenstein, 1953/2009]. As such, objects play a central role in semiotic mediation processes: in everyday life, human beings communicate permanently *about and through* objects, especially when, as it happens with babies, there is no language mediating. As follows, the concept of affordance is insufficient to explain how the construction of image schemas works. One of the several relevant problematics of affordances is that what objects afford depending on their physical characteristics is not equivalent to the *cultural function* they have [see the concept of *canonical affordances* in Costall & Dreier, 2006/2016]. Function is not prefigured in the “physical” materiality of objects nor is fixed. It is subject to sociocultural public rules of use, and it does not constitute an a priori but a milestone in development, a psychological construction.

Just as the pragmatics of language focused on the communicative uses of language [Bruner, 1975], the *pragmatics of the object* deals with the sociocultural analysis of how differential uses of objects and their communicative value are constructed. The *pragmatic turn* that this theory proposes returns the object to the cultural world, localizing it under the normative coordinates and rules that operate on our everyday life [Rodríguez, 2007, 2012a].

Up to this point, we have referred to two essential principles of the *pragmatics of the object*: (a) communicative processes, often involving objects, are important from the beginning to explain cognitive developmental achievements, and (b) objects have a type of permanence that goes beyond their physical characteristics (*functional permanence*). A serious consideration of them indicates that the minimum analysis unit for this perspective is an interaction that involves both objects and other significant subjects for the infant: triadic interactions [Moro & Rodríguez, 2005]. And that is because even when the responsibility is greater in the adult, triadicity starts from the moment the child is born, with the adult as intermediary between him and the world [Rodríguez, 2006, p. 202]. Choosing another type of analysis unit would involve ontological reductionisms that ignore one of the three necessary terms for knowledge construction: to get to know, the child has to go through the interpretative filter of reality that others possess and update when they communicate with him or her about things [Rodríguez & Moro, 1999, p. 125]. If meanings consolidate through children’s uses of objects, the keys that enable the construction of those particular uses are always held by the adults that act as a guide in communicative situations [Rodríguez, 2012b].

Thus, conventional or *canonical uses* of objects emerge within organized sets of triadic experiences that configure public meaning negotiation zones. To achieve this developmental milestone is the equivalent of saying that the object is working, finally, *as a sign of its use*, or similarly, that the object has been characterized in terms of the function that people usually use it for in everyday life. The complexity and importance of this milestone are clear: to use an object by its function (i.e., any spoon as a spoon) implies a qualitative jump for the child, every time he stops relating to isolated materialities and starts relating to members of classes [Rodríguez, 2012a]. Furthermore, conventional uses of objects become the base upon which *symbolic uses* [see Alessandroni, 2016; Palacios & Rodríguez, 2015; Palacios et al., 2016; Rodríguez, Palacios, Cárdenas, & Yuste, 2014], and cognitive self-regulation behaviors [Basilio & Rodríguez, 2011, 2016; Rodríguez, Estrada, Moreno-Llanos, & de los Reyes, 2017] are founded.

## A Way to Solve the Problems That Surround Image Schemas

The definition of image schemas posed by Lakoff and Johnson raises problems from a developmental point of view. These difficulties of CMT proceed from two sources: (a) image schemas are unlinked from early communicative processes, and (b) the object is “physicalized,” that is, only considered in relation to its physical properties and the action possibilities it affords, ignoring its culturally defined functional properties. From our perspective (*pragmatics of the object*), image schemas would not emerge directly from the individual action of the child in a transparent world, but from his semiotically mediated action in triadic interactive contexts (adult-child-object). So, children would not interact, in early childhood, with generic and innate schemes, but with particular objects whose uses (certainly diverse) are in the process of being constructed within communicative situations.

For example, in relation to the CONTAINER image schema, we propose that children would not interact with a generic CONTAINER that can be instantiated in different objects (a primitive concept of CONTAINER that enables children to equally interact with a pail, a toy box, a cup, a room or a football court, given they are all containers) [Lakoff & Johnson, 1999, p. 32]. On the contrary, we sustain that children would interact with (and through) specific and very diverse objects whose cultural function is to contain things in different ways. These cultural functions of objects are not transparent to the child. Their understandability is progressive and requires more than solitary action in the world: it entails cultural processes of semiotic mediation. Thus, the baby bottle is recognized as a container towards the fourth month of age [see Rodríguez et al., 2017], but a football court or a room is not. So, at this age, generic speech about the CONTAINER turns out to be irrelevant from a developmental perspective. Image schemas, as characterized by Lakoff and Johnson, would be more like a later and culturally based developmental achievement.

It could be argued that cultural processes of semiotic mediation are not necessary to understand the functions of objects or to construct image schemas. For instance, the use of tools by great apes would seem to suppose the existence of a generic understanding of the containment logic in the absence of human-like communicative-educational processes. In this article, we do not discuss the particularities of animal cognition for various reasons. First, because unlike the use of tools and objects, the problem of the existence of image schemas in nonhuman animals has not been analyzed in the academic literature. Secondly, because even if great apes built image schemas, there is no reason to think they would do it in the same way humans do (hence, our argument would not be affected).

Authors who defend the psychological reality of image schemas advocate for the existence of differential perceptual processes in human and nonhuman animals [see, for example, the distinction between a general *perceptual recognition* and the specifically human *perceptual analysis* drawn by Mandler, 1988, 1992]. To date, it is also unclear to what extent nonhuman animal species understand communicative intentions [Zlatev et al., 2013], and it has been proposed that both the learning and the communicative status of gestures in humans and great apes is different [Gómez, Kersken, Ball, & Seed, 2017; Lewis & Carpendale 2002; Tomasello, 1999; Tomasello, Carpenter, Call, Behne, & Moll, 2005]. Thus, research suggests the existence of “key differences in the pattern and pace of cognitive development between humans and other apes, particularly in the early emergence of specific social cognitive capacities in

humans” [Wobber, Herrmann, Hare, Wrangham, & Tomasello, 2014, p. 547]. These perceptual, attentional, and communicative differences suggest that processes of meaning and tool use construction could follow distinctive cognitive trajectories in humans and great apes. However, the participation of great apes in human cultural contexts seems to promote differential cognitive processes [Lyn, Russell, & Hopkins, 2010]. For instance, a study by Furlong, Boose, and Boysen [2008] showed that enculturation is a determinant for the correct solving of tasks originally designed by Povinelli [2000]: “Since enculturation impacts social learning, and social learning affects tool use, enculturation represents mediating variables between social cognition, in general, and tool use, in particular” [Furlong, Boose, & Boysen, 2008, p. 85]. This finding would seem to reinforce our argument in favor of the cultural origin of the uses of objects and image schemas. Next, we analyze evidence from different disciplinary fields that support our perspective.

*The Cultural Genesis of the Conventional Use of a Toy Truck.* Within the field of developmental psychology, Rodríguez and Moro [1999] conducted a longitudinal study to evaluate the evolution of the uses of objects that the child performs in different developmental times before language, and the changes in communication between child and adult. They worked with a research sample of six child-adult dyads they traced, in ecological contexts, for 6 months (between children of 7 and 13 months of age). The researchers asked mothers to play with their children as they would do habitually, and performed an observational record of the communicative-interactive exchanges. In their design, Rodríguez and Moro used two replica objects as experimental material: a truck and a telephone. Of the two objects, that which we are interested in is the truck, because its canonical use involves using it as a container. The authors describe the object in the following way: at the top there are six holes of different shape. Through each hole, toy shapes of different colors can be inserted. The shape of the toy matches those at the top of the truck, so that the round toy shape can only be entered through the round hole, and so on. The truck is “loaded” when toy shapes are inserted in it through the holes. It is “unloaded” from the rear by a door that opens to remove the toy shapes [Rodríguez & Moro, 1999, p. 136]. As the researchers say, the truck is an object of habitual use in game situations in western culture. Because of the material characteristics it has, and the usage conventions associated with it, the truck becomes an object whose canonical use involves inserting the shapes inside it through the holes, and inserting or extracting them through the rear door.

The results of the study show that, at 7 months, children never take the initiative to conventionally use the truck in interactive situations. These findings indicate that, at this age, children do not understand the truck in a canonical way (as a container object). The uses that children perform with the truck on their own initiative are, most of the time, noncanonical, undifferentiated uses that can be applied to nearly every object without reference to the specific use(s) they have [Rodríguez & Moro, 1999, p. 160]. In this developmental moment the adults are the ones that intervene, showing children how the truck is canonically used through *communicative mediators of use*. Communicative mediators used by adults are many and very varied: *distant demonstrations, immediate demonstrations, ostensive gestures* with toy shapes, and *pointing gestures, adjustments and preparations*. Despite the semiotic richness of these resources, children of 7 months of age do not answer them with canonical uses of the truck. On the contrary, these semiotic resources generate other answers. For example, distant

demonstrations make children look at the adult's action, while ostensive gestures, besides driving the children's eyes towards the adult's actions, incite children to perform *noncanonical uses* or precursors of canonical uses (*protocanonical uses*). In summary, despite the complexity of the resources that adults put into play in interactive situations, at 7 months, children only use the truck canonically in exceptional cases (22.5% of the sequences of this age), and only after adults use certain communicative mediators (they never take the initiative). At 10 months of age, children canonically use the truck in 44.2% of the sequences, taking the initiative in 29% of them. At 13 months of age, children take the initiative to use the truck canonically 60% of the time. The analysis of the relative importance of communicative mediators that adults put into play also had interesting results. Distant demonstrations, for instance, now provoke, in 32.4% of the sequences, that children perform canonical uses of the truck. This tendency to generate canonical uses also appeared when analyzing immediate demonstrations, pointing gestures and ostensive gestures<sup>4</sup>.

The data we have reviewed show that canonical uses are not properties inherent to objects, but normative constructions that depend on the sociocultural interactive experience. Thus, *object* and *object use* do not coincide and should not be confused. Different object uses are based on cultural and conventional systems of rules or codes that come to life within the communicative exchanges between the adult and the child [Rodríguez & Moro, 1999, p. 132]. From this perspective, the toy shapes are not per se objects that can be "introduced" in the truck, and the truck is not, a priori, a container of toy shapes. To say that the truck is a container is to say that, culturally, it must be used as a toy shape container. But, as we have mentioned, this is not evident to children: despite the huge efforts of their mothers, children of 7 months of age cannot carry out the task<sup>5</sup>. This endorses the view that the canonical use of objects constitutes a developmental milestone only achieved through communicative interaction with people who know it, and that progressively make it legible to children.

*Objects Also Become Containers in the Classroom.* Other studies, done from the educational sciences, cooperate in denying the early existence of the CONTAINER image schema. These investigations analyze two activities that take place in Infant School 0–2: the *treasure basket* and *heuristic play*.

The treasure basket is a gaming activity directed to children from 6 to 10/12 months of age [Majem, 2001]. The activity is organized around a basket in which the teacher places different objects to offer them to children (namely, he uses the basket as a container for other objects). As Goldschmied and Jackson [1997/2000] emphasize, the manipulation processes of objects and the verbal/gestural interactions with objects in which children get involved work as the basis for an adequate organization of space and the elements of physical experience. Through participation in the treasure basket, children develop the functions of preparation, collection and organization of the materials of its environment. As we mentioned earlier, in this activity it is

<sup>4</sup> Moro & Rodríguez [2005] conducted the same study with 6 Swiss children, obtaining the same results.

<sup>5</sup> It should be noted that this restriction is not due to lack of motor control in 7-month-old children. There are two sources of evidence to support this. First, at 7 months of age children do not accept that adults put the telephone handset at their ear. If the problem for performing canonical uses was motor skill, children would willingly accept the immediate demonstration. Second, in the study, children's attempts to place the toy shapes in the truck were considered as canonical uses, even when they were failed attempts.

the adult who organizes the basket as a container and who offers it to children so they can take out particular objects [Goldschmied & Jackson, 1997/2000, p. 93]. Hence, the use of the basket as a container is pedagogical diachronic content (i.e., it must be learned) that begins to be used in the 0–1 classroom by means of this kind of guided activities with objects, before babies crawl [Madariaga, 2012].

During the second year of life (between 12 and 24 months of age), other activities can occupy the didactic scenario. One of them is the heuristic play activity [Òdena, 2001]. In heuristic play, teachers arrange in a room three types of materials: little objects (as sponges, narrow chains, pieces of cork, balls, among others), rigid container objects (cardboard or metal cylinders, buckets, wooden boxes, among others), and flexible container objects (such as cloth bags). The main activity has two phases: the first one consists of *exploration* and *combination* of objects, and the second one of *recollection* of objects inside containers. During the first phase, actions like put-take out, fill-empty, open-close, or cover-uncover take place in an interactive ground. Meanwhile, the adult's intervention in the second phase is focused in recollecting the objects and putting them inside containers, showing the child how he must do it (distant demonstrations of canonical uses) [Domènech & Amorós, 2012; Iturgaiz, 2012]. Likewise, adults tend to group objects and to offer containers to children to invite them to perform the action of recollecting objects. So, the adult may start recollecting objects, taking away the containers that are not used anymore, and directly inviting some child to accompany him [Òdena, 2001, pp. 64–66]. Once the heuristic game is established as a common activity, children start to share with adults in a more dynamic way the moment of recollecting objects inside the different specific containers.

The establishment of the containment function of objects appears, again, as an educative purpose and a developmental achievement, enabled by the progressive mobility of the child, the semiotic mediation of adults, and the interaction with certain objects selected according to pedagogical criteria. Objects do not behave as containers naturally – only as a function of their public and cultural signification. Without the mediation of the adult as a guide it would be impossible to talk about a child in interaction with containers. That successfully explains a notorious disparity (not mentioned by Lakoff and Johnson) that takes place in development in relation to the use of container objects, both in the treasure basket and in heuristic play: children take out objects from containers without inconvenience *long before* learning to recollect objects and put them into containers<sup>6</sup>. This fact is well known in the educational field. That is why legal frameworks of Infant School locate the activities of taking, collecting and putting in as educative contents belonging to different moments of development and learning [see, for example, Ministerio de Educación y Ciencia, 2008]. The canonical use of the objects that in everyday life work as containers must be construed (learned) through communicative and educative triadic interactions. It is not *in* the object from the beginning as an intrinsic property. If children would possess a generic CONTAINER image schema, motivated by their solitary action in the world, the disparity we have mentioned would not be possible to explain; children ought to be equally effective when taking out and collecting objects from and in containers.

<sup>6</sup> Our observation 3 shows that, for the child, the activity of taking balls out of the toy truck presents no inconvenience. However, putting those balls inside a bucket is not evident for him. The child gets to put the balls inside the bucket after a very active intervention of his mother through different semiotic resources.

*Difficulties with Using a Box as a Container in a Girl with Down Syndrome.* A third source of evidence comes from the results by Cárdenas, Rodríguez and Palacios [2014] in a longitudinal case study that explored the types of container uses performed by a little girl with Down syndrome, between 12 and 18 months of age. One observation of the study, carried out when the girl was 11 months and 30 days old, showed the way in which her mother tries to get her to take a stone and put it in a box (canonical use of the box). Repeatedly, the mother offers the stone to the girl and, once she has caught it, performs indexical gestures (specifically pointings), showing that the stone must be placed inside the box. The girl, meanwhile, takes the stone to her mouth (noncanonical use). The mother unfolds, then, a series of educative resources, among which there are communicative redundancies (such as touching the box one and multiple times), and rhythmic-sonorous uses [Moreno-Núñez, Rodríguez, & del Olmo, 2015] (moving the box to make it sound by virtue of the objects it has inside). After implementing these resources, the girl answers performing, again, two noncanonical uses: taking the stone to her mouth to suck it and hitting the box. As the authors say, this happens, probably, because:

G [the girl] doesn't share the same meanings as M [the mother] in relation to the box's use. For G, the box is not yet a "box" where things are put or kept in. In other words, it is not yet a sign of its use for her. [Cárdenas, Rodríguez, & Palacios, 2014, p. 422]

The point that we wish to pursue coincides with what we mentioned about the Infant School 0–2: the functional permanence of the objects (the one by which certain objects begin to be used as containers) is a result – not a starting point – of development, both in typical and atypical ontogenetic trajectories, both at home and at school.

*Object, Normativity, and Communication: The Pragmatic Perspective.* Another of the problems analyzed in the third section is linked to the connection between image schemas (as natural, primitive, basic, and direct structures) and language (as a highly regulated and conventional semiotic system). If, as we claimed, the functional permanence of objects [Rodríguez, 2006; 2012a] is a conventional product (result of participation in triadic interactions), this problem dissolves. Indeed, it is no longer necessary to wait for language for the child to enter the world of public rules. The child is born in a regulated and public world. Adults establish the context within which the child appropriates conventions. However, from our perspective, normativity circulates through different levels of semiotic complexity. Thus, it becomes necessary to talk about conventions, for example, at the level of uses of objects and gestures. To gain the use of a spoon as a spoon [Ishiguro, 2016; Rodríguez et al., 2017], or a box as a container, is an example of a developmental achievement that involves the understanding of rules about cultural uses of complex referents. Not accepting this would imply a denial of the existence of communication before language, given that communicative understanding is only possible by virtue of normatively shared meanings, that is, a socioculturally anchored common ground. In fact, a detailed look at the types of semiotic normativity that operates underneath language could provide the key to understanding the conventional foundations on which it is based [Rodríguez, 2015], an issue that is beyond the scope of this article.

The proposal we have outlined from the *pragmatics of the object* invites researchers to reconsider the role that objects (and the communicative exchanges that surround them) play in the construction of thought, including metaphorical thought. As



we have defended elsewhere, certain symbolic uses of objects can be considered to be *metaphors in action* in full right, grounded in functional uses of objects [Alessandroni, 2016]. Without a normative world triadically and culturally constructed, symbolic uses that children start performing at the end of the first year could not occur, nor could they be understood by adults. Thereby, the idea of semiotic mediation in triadic contexts gains relevance as a possibility to explore the complex communicative circuits that enable the establishment of conventions at different levels, the level of canonical uses of objects among them. This is the semiotic level in which certain objects become specific containers and take on socioculturally constructed meanings. Metaphorical thought, from our perspective, is grounded in this functional permanence of objects and not in generic, primitive, or noncultural structures, as CMT advocates. In the next section we present, as an empirical illustration, the results of a quantitative and qualitative analysis of a video in which a mother interacts with her 17-month-old son at home, around different container objects. We will show what particular characteristics the uses of the different containers exhibit in an interactive, triadic, and ecological situation.

### **An Empirical Illustration: David<sup>7</sup>, His Mother, and the Different Containers**

#### *Context of the Video*

David [1; 5 (6)]<sup>8</sup> interacts with his mother and several objects in a room of their home in which the child's toys are located. The mother has been asked to interact with her child as she usually does. The interaction extends along 23 min and 25 s. In the room there are eight objects that, at some point during the interaction, are used as containers: (a) a toy box; (b) a bucket; (c) a washing liquid dosing ball; (d) a set of assemblable building bricks; (e) an assemblable large toy; (f) a shovel; (g) a concave red arch, and (h) a cubic wooden cart. Other objects are part of the interactive situation: medium-sized balls of different colors, a yellow tube, cubes of different colors, a replica adjustable wrench, a musical horn, a plush bird and a replica tambourine.

#### *Procedure*

Before the recording, the informed consent was obtained from the child's parents. The methodological frame for the multimedia recording was that of nonparticipating observation [Shaughnessy, Zechmeister, & Zechmeister, 2003/2012]. The session was transcribed using the software ELAN<sup>9</sup> (v. 4.9.2, 2016) [Lausberg & Sloetjes, 2009], and coded following the procedure described in Rodríguez and Moro [1999]. Events congruent with the following categories were transcribed separately: (a) actions carried out by the mother and the child; (b) uses of objects performed by

<sup>7</sup> The name of the child does not correspond with his real name.

<sup>8</sup> Chronological age: [years; months (days)].

<sup>9</sup> Max Planck Institute for Psycholinguistics, The Language Archive, Nijmegen, the Netherlands. URL: <http://tla.mpi.nl/tools/tla-tools/elan/>.

**Table 2.** Observation categories and examples – gestures and their functions

Child	Mother
Gestures	Gestures
<p>A. <i>Ostensive</i></p> <p>1. <i>Communicative</i></p> <ul style="list-style-type: none"> <li>i. Declarative: showing the washing liquid dosing ball to the mother</li> <li>ii. Imperative: offering an object to the mother for her to take it</li> <li>iii. Interrogative: holding up a toy cube to see if that is what the mother wanted</li> </ul> <p>2. <i>Self-directed</i></p> <ul style="list-style-type: none"> <li>i. Exploratory: showing himself an object, in a contemplative act, to explore it</li> <li>ii. Private: showing himself an object, reflecting on how to use it, with a self-regulatory function</li> </ul>	<p>A. <i>Ostensive</i></p> <p>1. <i>Communicative</i></p> <ul style="list-style-type: none"> <li>i. Declarative: showing a ball to the child</li> <li>ii. Imperative: offering the bucket to the child indicating him to place something inside</li> <li>iii. Interrogative: offering the bucket to the child asking him if he wants that or something else</li> </ul>
<p>B. <i>Ostensive-indexical</i></p> <p>1. <i>Communicative</i></p> <ul style="list-style-type: none"> <li>i. Imperative: dragging an assemblable toy and leaving it near the mother for her to use it (<i>placing</i>)</li> </ul>	<p>B. <i>Ostensive-indexical</i></p> <p>1. <i>Communicative</i></p> <ul style="list-style-type: none"> <li>i. Declarative: grabbing a brick tower and placing it in front of the child (<i>placing</i>)</li> <li>ii. Imperative: touching the shoulder of the child with the index finger for him to turn around (<i>touch-pointing</i>)</li> <li>iii. Interrogative: leaving an object near the child asking him what he can do with it (<i>placing</i>)</li> </ul>
<p>C. <i>Indexical</i></p> <p>1. <i>Communicative</i></p> <ul style="list-style-type: none"> <li>i. Declarative: pointing the toy box to guide his mother's attention to it</li> <li>ii. Interrogative: pointing the bucket to see if that is what the mother wanted him to use</li> </ul>	<p>C. <i>Indexical</i></p> <p>1. <i>Communicative</i></p> <ul style="list-style-type: none"> <li>i. Declarative: pointing at a ball to guide the child's attention to it</li> <li>ii. Imperative: pointing at an object for the child to give it</li> <li>iii. Interrogative: extending the hand toward an object the child has, asking him if he wants to give it</li> </ul>
<p>D. <i>Symbolic</i></p> <p>1. <i>Communicative</i></p> <ul style="list-style-type: none"> <li>i. Declarative: covering his face with his hands to prevent a plush bird controlled by the mother to "sting his face"</li> <li>ii. Imperative: extending the open palm up and forward, rejecting an object offered by the mother (<i>stop gesture</i>)</li> </ul>	<p>D. <i>Symbolic</i></p> <p>1. <i>Communicative</i></p> <ul style="list-style-type: none"> <li>i. Declarative: raise the fist closed to positively evaluate a certain action of the child</li> <li>iii. Interrogative: raising the hand by joining the fingers, asking the child what he is doing</li> </ul>

Research from the *pragmatics of the object* about each category. A1: Basilio [2014]; Basilio & Rodríguez [2016]; Moro & Rodríguez [2005, 2008]; Rodríguez, Moreno-Núñez, Basilio, & Sosa [2015]; Rodríguez & Moro [1999, 2008]. A2: Basilio [2014]; Basilio & Rodríguez [2011, 2016]; Dupertuis & Moro [2016]; Moro, Dupertuis, Fardel, & Piguet [2015]; Moro & Rodríguez [2005, 2008]; Rodríguez [2009]; Rodríguez, Moreno-Núñez, Basilio, & Sosa [2015]; Rodríguez & Palacios [2007]. B: Moreno-Núñez [2014]; Moreno-Núñez, Rodríguez, & Miranda-Zapata [submitted]; Rodríguez, Estrada, Moreno-Llanos, & de los Reyes [2017]. C: Basilio [2014]; Basilio & Rodríguez [2016]; Moro & Rodríguez [2005]; Palacios & Rodríguez [2015]; Rodríguez & Moro [1999, 2008]; Rodríguez & Palacios [2007]. D: Basilio [2014]; Basilio & Rodríguez [2016]; Rodríguez [2009].

the mother and the child; (c) gestures performed by the mother and the child; (d) language used by the mother; (e) vocalizations made by the child, and (f) *container-center-of-the-action* (CCA) in each moment, for the mother and the child. A CCA is an object that functions as a container and that, in a given moment, acts as the locus around which the actions of the child, the mother or both are organized. For example, in the cases in which the child takes out a ball from the toy box, although the direct action is performed on the ball, the toy box was considered the CCA. The categories used to classify uses and gestures coincide with those already used in other investigations made from the *pragmatics of the object* (Tables 1, 2).

Once the use and gesture profiles were obtained, we cross-referenced the categories CCA and uses, and CCA and gestures, to evaluate how many uses and gestures (and what types) the child and his mother performed around the particular CCA. In addition to considering frequency, we took into account other analysis dimensions for each variable, such as *minimum duration*, *maximum duration*, *average duration*, and *total duration* in seconds. We carried out a qualitative content analysis of the most relevant scenes of the video [Frost, 2011]. Some of the results are presented below.

### *Results: Quantitative Analysis*

The frequency analysis allowed us to show that both the child and the mother performed a great number of uses around the different container objects (Table 3). Throughout the video, the child performs 232 uses. Meanwhile, the mother performed 95 uses. Two  $\chi^2$  tests of goodness of fit were performed to determine whether the different CCAs were equally preferred by the child and the mother. Preferences for the different CCAs were not equally distributed [child:  $\chi^2(7, n = 232) = 412, 75, p = 0.000$ ; mother:  $\chi^2(3, n = 95) = 218, 55, p = 0.000$ ]. These results contradict the abovementioned hypothesis of interactive equality proposed by Lakoff and Johnson [1999, p. 32].

The toy box and the bucket are the container objects with which more uses were performed. With the toy box, the number of uses the child performed is 111 (47.84% of his total uses), while the number of uses the mother performed was 86 (90.52% of her total uses). If the toy box and the bucket are considered together, a total of 186 uses was obtained for the child (80.17% of his total uses), and a total of 93 uses was obtained for the mother (97.89% of her total uses). On the other hand, the total number of observed uses around the diverse CCAs, both for the child and the mother, do not distribute normally between the different subcategories of uses [child:  $\chi^2(5, n = 232) = 603, 81, p = 0.000$ ; mother:  $\chi^2(3, n = 95) = 246, 51, p = 0.000$ ]. This suggests that CCAs can be used at different degrees of semiotic complexity, and that these degrees do not equally occur in interaction. For instance, with most container objects the performed uses are canonical (or canonical demonstrations of the mother, that constitute the communicative-educative correlate of canonical uses) (Table 3). The accumulation of 24 *metacanonial uses* that the child performed with the washing liquid dosing ball was relevant for our study and will be addressed in the qualitative analysis (see observation 4, Table 7). Other uses (noncanonical, protocanonial, rhythmic-sonorous, and symbolic) do not occur with such assiduity.

As for the duration of the interactions around the different CCAs, the results are similar to those of the frequency of uses. Both for the child and his mother, the toy

**Table 3.** Crossing of the variables CCA/uses (child and mother)

CCA (child)	Uses						Total
	NC	PC	R-S	C	M	S	
Toy box	3	9	3	96	–	–	111
Bucket	2	4	2	66	–	1	75
Washing liquid dosing ball	–	–	–	–	24	–	24
Assemblable toy	–	3	–	8	–	–	11
Assemblable building blocks	–	–	–	7	–	–	7
Shovel	–	–	2	–	–	–	2
Red arch	–	–	–	–	1	–	1
Wooden cart	–	1	–	–	–	–	1

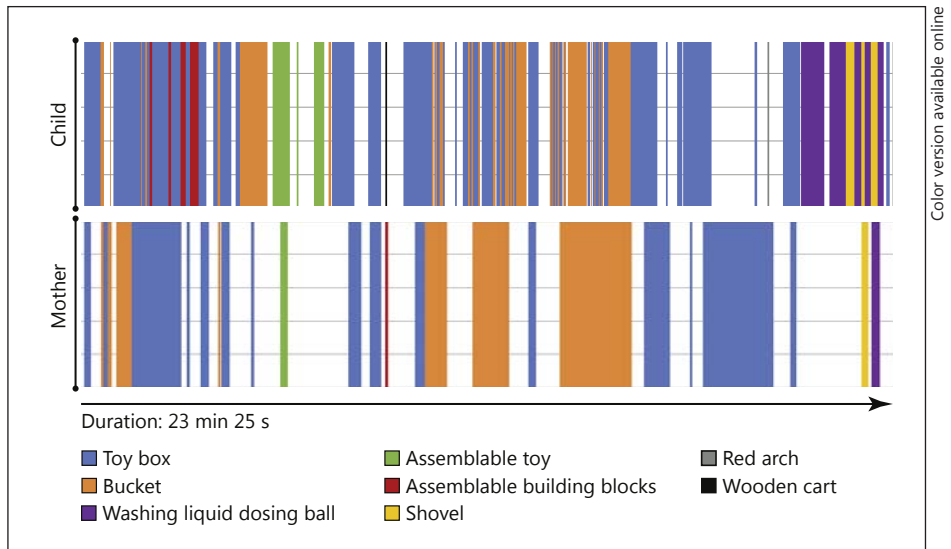
  

CCA (mother)	Demonstrations						Total
	NC	PC	R-S	C	M	S	
Toy box	–	–	1	84	–	1	86
Bucket	–	–	–	5	–	2	7
Washing liquid dosing ball	–	–	–	–	1	–	1
Assemblable toy	–	–	–	1	–	–	1

CCA, container-center-of-the-action; NC, noncanonical; PC, protocanonical; R-S, rhythmic-sonorous; C, canonical; M, metacanonical; S, symbolic.

box and the bucket are the container objects around which the longest and shortest triadic interactions are grouped. For the child, maximum durations were 48.35 s (toy box) and 47.08 s (bucket), and minimum durations were 0.98 s (toy box) and 0.61 s (bucket). For the mother, maximum durations were 120.41 s (toy box) and 123.41 s (bucket), and minimum durations were 2.50 s (toy box) and 2.42 s (bucket). It should be noted that the durations of the mother's interactions were longer than those of the child (they almost triple his values). If these two objects are considered together, they have an interaction cumulative duration of 724.56 s (48.48% of video total time) for the child, and 633.1 s (44.98% of video total time) for the mother. The activity of the mother and the child around different CCAs can be compared in the microgenetic visualization (Fig. 1). These results clearly show that both the child and his mother dedicate very dissimilar amounts of time to particular CCAs.

Gestures are not distributed normally between the different container objects either [child:  $\chi^2(4, n = 40) = 36, p = 0.000$ ; mother:  $\chi^2(4, n = 54) = 95.63, p = 0.000$ ]. In the case of the child, the privileged container objects around which gestures are grouped are the toy box (55% of total gestures), the washing liquid dosing ball (25%), and the bucket (10%). In the case of the mother, the privileged CCAs are the toy box (70.37% of total gestures) and the bucket (24.07%). The profiles of gestures that are grouped around different CCAs are dissimilar for the child and the mother. For example, out of the 22 gestures that the child performed around the toy box as a CCA, most of them (12 in total) are indexical-communicative-declarative. For the same CCA, the mother performed 38 gestures. Most of them (25 in total) are ostensive-



**Fig. 1.** Microgenetic visualization of mother-child activity around different CCAs.

communicative-interrogative gestures, where the gesture with the object at hand is sign and referent at the same time.

#### *Results: Qualitative Analysis*





In the following pages we present four qualitative observations of triadic interactions, which last between 30 s and 1 min. In all of them, David and his mother interact with each other and with container objects that differ in various ways. With this analysis we try to show the diversity and complexity of uses and gestures that are grouped together around different container objects.

#### *Observation 1: David [1; 5 (6)] Performs Rhythmic-Sonorous, Canonical, and Protocanonical Uses with a Bucket (Table 4)*

In this observation David performs different rhythmic-sonorous uses with the bucket, shaking it from the edges to move the toy cubes inside the bucket. By doing this, the child can hear the sound the cubes generate when hitting the bucket walls and watch their movement. It is a type of use that takes advantage of the interior space and the walls of the bucket as a concrete container object. It is important to notice that, here, the impeller of the proposals of uses of the bucket is the child.

Apart from the rhythmic-sonorous uses, in this observation we find canonical uses (putting the toy cubes into the bucket and taking them out). In our culture, buckets are frequently used as containers of very diverse things. The mother accompanies the action of the child from a contemplative position, uttering expressions of *positive*

**Table 4.** Observation 1 (color version available online)

<p>Context of the session:</p> <p>Duration:</p>	<p>David (D) and his mother (M) are near the toy box, where they have been searching for objects (<i>canonical uses</i>)</p> <p>44 s. Start: 04:32 – end: 05:16</p>
	<p>1. D sees, near the toy box, a bucket with three cubes inside. He takes it.</p> <p>2. D shakes the bucket full of cubes seven times. The cubes in the interior space make sound when hitting the walls of the bucket (<i>rhythmic-sonorous uses</i>).</p>
	<p>3. D takes out one of the cubes from the bucket (<i>canonical use</i>).</p> <p>4. M says: “Look the things you have found” (<i>positive evaluation</i>).</p> <p>5. D takes out the other cubes from the bucket, one by one (<i>canonical uses</i>), leaving them on the floor.</p> <p>6. M says: “Very good ‘Titi’” (<i>positive evaluation</i>).</p> <p>7. D picks up the cubes from the floor and puts them in the bucket (<i>canonical uses</i>).</p>
	<p>8. M takes out the lid of the bucket from the toy box.</p> <p>9. M performs an <i>ostensive-indexical gesture (placing)</i> with the bucket lid, suggesting the child to use it to close the bucket.</p>
	<p>10. D takes out three cubes from the bucket (<i>canonical uses</i>).</p> <p>11. D places the bucket lid on top of it, upside down (<i>protocanonical use</i>).</p> <p>12. D and M clap. M exclaims: “Hurrah!”</p>

*evaluation* [see, for example, Basilio & Rodríguez, 2016; Tronick, 1989]. Lastly, we registered a protocanonical use: the child’s attempt to cover the bucket by placing the lid upside down. The child performed this use as an answer to the ostensive-indexical gesture (placing) that his mother directs to him with the bucket lid. In this brief observation, therefore, the bucket is a complex referent upon which the child performs three types of uses that are semiotically very diverse (rhythmic-sonorous, canonical, and protocanonical uses), while his mother contemplated and approved his action.

These uses make up a rich matrix that enables the inquiry of the interior space and the edges of the bucket by kinesthetic, visual and rhythmic-sonorous explorations (through movements).






*Observation 2: David [1; 5 (6)] and His Mother Perform Rhythmic-Sonorous Uses on the Lid of the Toy Box (Table 5)*

This interactive situation shows how the actions of the mother and the child are mutually regulated to function in a web of intentionalities that unfold in communication through different semiotic systems. In the beginning, David is directing his attention to the toy box. His mother, instead, tries to guide him to the musical horn through an ostensive gesture that the child seems to ignore. This first communicational disagreement (particularly gestural) is solved when the child closes the toy box and the mother accompanies the closing of the lid with a vocalization. The child's laughter evidences that he and his mother are now sharing a common referent: the toy box. The mother proposes, then, to dance to the rhythm of a melody produced by a musical toy. The child does not only accept this musical invitation, but he does so proposing to keep the referent toy box. Perhaps this led him to decide to use the replica adjustable wrench like a musical drumstick on the toy box lid (rhythmic-sonorous use) and not, for instance, just dance. Here, the mother is very active. She directs her gaze to the child while moving her head to the rhythm of the music with an amazing degree of rhythmic accuracy. The mother embodies (represents) musical rhythm with her head's movement and in her gestures: when she touches the child on his back with her index finger repeatedly, she does so following the metrical structure of the music.

As a corollary, the child gets to percuss on the toy box lid following the rhythmic structure of the music without external support, given that the mother is no longer moving her head or providing clues about the organization of sonorous events. In the end of this observation, the child offers the replica adjustable wrench to his mother. She interprets the ostensive gesture of the child as an invitation to percuss on the toy box lid. This invitation has important interactive implications because it involves the reversal of roles and communicative shift-taking: what the child did before is now performed by his mother (demonstration of rhythmic-sonorous use).

In conclusion, in observation 2, we attend to an interactive situation in which, from a referential disagreement and the musical proposal of the mother, her actions and the child's progressively coordinate to function as an external metrical structure, provided by a musical toy. The toy box functions as material support for this process of progressive communicative coordination. Mother and child explore the rhythmic possibilities of the toy box, while it is closed, through rhythmic-sonorous uses. Because of that, in this case, the action is centered on the toy box lid. It is about a completely different use of the toy box container than the one described in the previous observation, in which the exploration of the interior space of the bucket was highlighted. This evidence shows empirically that object and object use do not always coincide. Here, for instance, the toy box container is not operating as such, but as instrument-on-which-to-percuss.

**Table 5.** Observation 2 (color version available online)

<p>Context of the session:</p> <p>Duration:</p>	<p>David (D) is in front of the opened toy box and is holding a replica adjustable wrench</p> <p>31 s. Start: 07:16 – end: 07:47</p>
	<ol style="list-style-type: none"> <li>1. The mother (M) offers D a musical horn (<i>ostensive gesture</i>).</li> <li>2. D does not look at M.</li> <li>3. M asks D: “What else do you want?”</li> </ol>
	<ol style="list-style-type: none"> <li>4. D closes the toy box lid (<i>canonical use</i>).</li> <li>5. M exclaims “Uhhh” (descendent melodic curve). D smiles.</li> <li>6. M asks D: “Are you going to dance or not?” M turns on a musical toy. M looks at D and moves her head to the rhythm of the music.</li> <li>7. D closes the left lock of the toy box (<i>canonical use</i>).</li> </ol>
	<ol style="list-style-type: none"> <li>8. D percusses 9 times the toy box lid with the replica adjustable wrench (<i>rhythmic-sonorous uses</i>). His strokes are isochronous to each other, but they do not fit the metrical structure of the melody of the musical toy.</li> <li>9. D smiles and shows to himself the adjustable wrench (<i>self-directed ostensive gesture with exploratory function</i>).</li> <li>10. M keeps on moving her head to the rhythm of the music. M touches the child’s back three times, using her index finger. The touches of M are adjusted to the metrical structure of the melody.</li> <li>11. D percusses 7 times the toy box lid with the adjustable wrench (<i>rhythmic-sonorous uses</i>). The strokes fit the metric organization of the melody.</li> </ol>
	<ol style="list-style-type: none"> <li>12. D offers the replica adjustable wrench to M (<i>ostensive gesture</i>).</li> <li>13. M takes the adjustable wrench.</li> </ol>
	<ol style="list-style-type: none"> <li>14. M performs, with the wrench, 7 strokes on the toy box lid (<i>demonstration of rhythmic-sonorous use</i>), respecting the rhythmic organization of the melody.</li> </ol>



*Observation 3: The Mother Guides David [1; 5 (6)] to Transfer Balls from the Toy Box to the Bucket (Table 6)*






The axis of the observation is a set of canonical uses that unfold interactively. In the beginning, David tries to open the toy box, but he does not achieve it. Both in this observation and in other moments of the video it becomes evident that the child still cannot coordinate the opening of the toy box lid with his body movements. What David can do with the lid is, then, a protocanonical use, a use that is partially adapted to the cultural rules of use of an object (not fully effective), but that has a greater degree of direction and precision than a noncanonical use [Rodríguez & Moro, 1999]. Then the mother approaches the toy box and collaborates with the child in its opening, enabling its canonical use. After that, she tries to establish what the child wants to do with the toy box by asking him, “What do you want?” David, by taking a ball from the toy box, makes it clear what he wanted. This action, which appeared many times during the observation, constitutes a canonical use of the toy box. Toy boxes are designed to store objects that can be recovered later.

However, in the observation, once the child takes the objects off the toy box, he throws them to the floor. What is interesting is the mother’s proposal to use the bucket as the target-container to which to “transfer” the objects that are taken from the box. This proposal involves a canonical use of the bucket. The child does not pick up on this proposal immediately. This shows that the container-of-balls function of the bucket that the proposal requires is not transparent to the child. To facilitate the child’s understanding, the mother takes the balls discarded by the child and puts them into the bucket four times (demonstration of canonical uses). It is a strategy that highlights over and over the communicative referent that the mother pretends to establish intentionally and that, long before, she verbalized by saying “Let’s put them *here*” (referring to the balls and the bucket). As another way to strengthen her proposal, the mother ostensibly lifts the bucket toward David. Only after that does David answer in a coordinated way, following the invitation of his mother, and puts four balls into the bucket.





*Observation 4: David [1; 5 (6)] Performs a Metacanonical Use with a Washing Liquid Dosing Ball (Table 7)*

In this last observation, we focus on the microgenetic process of discovering the washing liquid dosing ball as a container. This process starts with the proposal of the mother to put the objects in the toy box. David responds with no resistance, actively collaborating and putting two toy prisms and a pyramid in the toy box. However, something different happens when the mother offers the yellow tube to the child. David does not take it, and, instead, he starts to explore the environment on his own, until he finds the washing liquid dosing ball. Here a communication conflict arises. For the mother, the dosing ball does not fit in the interactive situation in which it is taking place, and it has no link with the tube she is offering; the dosing ball is not an object that, culturally, should be stored in the toy box. On the contrary, it is a very specific instrument, whose conventional use involves the dosage and placement of the washing liquid to do the laundry. Within the context of this pragmatic mismatch the meaning of the sentences the mother pronounces becomes intelligible: “That is the washing machine dosing ball” and “Yes, that one goes apart.”

**Table 6.** Observation 3 (color version available online)

Context of the session:	David (D) and his mother (M) are in front of the locked toy box
Duration:	58 s. Start: 09:28 – end: 10:26
	<ol style="list-style-type: none"> <li>1. D tries to open the toy box. He cannot flip the lid completely (<i>protocanonical use</i>). He complains vocalizing.</li> <li>2. M helps D completing the lid opening (<i>demonstration of canonical use</i>).</li> <li>3. M searches inside the toy box. She asks D: “What do you want?”</li> </ol>
	<ol style="list-style-type: none"> <li>4. D points to the interior space of the toy box and exclaims “dé” (de). He takes out a ball (<i>canonical use</i>) and utters “gudié” (gu’dje).</li> <li>5. D offers M the ball. M does not take it. D throws the ball inside the toy box (<i>canonical use</i>).</li> </ol>
	<ol style="list-style-type: none"> <li>6. M takes out a ball from the toy box. She offers it to D (<i>ostensive gesture</i>) and asks him: “Do you want to take out the balls?”</li> <li>7. M puts the ball in the bucket that is near the toy box (<i>demonstration of canonical use</i>).</li> <li>8. D takes out a ball from the toy box (<i>canonical use</i>) and throws it to the floor.</li> <li>9. M picks up that ball and introduces it in the bucket (<i>demonstration of canonical use</i>).</li> <li>10. D takes another ball out of the toy box and throws it to the floor.</li> </ol>
	<ol style="list-style-type: none"> <li>11. M places the bucket between her and the child. She proposes him: “Let’s put them here!” M picks up the ball from the floor and puts it in the bucket (<i>demonstration of canonical use</i>).</li> <li>12. D takes another ball out of the toy box, and throws it to the floor.</li> <li>13. M picks up that ball and puts it in the bucket (<i>demonstration of canonical use</i>).</li> </ol>
	<ol style="list-style-type: none"> <li>14. D takes another ball out of the toy box and turns toward M.</li> <li>15. M raises the bucket and offers it to D (<i>ostensive gesture</i>), suggesting him to put the balls there.</li> <li>16. D puts the balls into the bucket (<i>canonical uses</i>).</li> <li>17. D takes three balls from the toy box, and puts them in the bucket (<i>canonical uses</i>).</li> </ol>

**Table 7.** Observation 4 (color version available online)

Context of the session:	David (D) and his mother (M) are seated in front of the opened toy box
Duration:	54 s. Start: 20:28 – end: 21:22
	<ol style="list-style-type: none"> <li>1. D picks a pyramid from the floor and puts it in the toy box (<i>canonical use</i>).</li> <li>2. M proposes to put there all the toys, saying: “Shall we store this one?”</li> <li>3. D picks up two prisms and puts them in the toy box (<i>canonical uses</i>).</li> <li>4. M asks D: “Shall I help you?” and puts a red arch in the toy box (<i>demonstration of canonical use</i>).</li> </ol>
	<ol style="list-style-type: none"> <li>5. M offers D a yellow tube (<i>ostensive gesture</i>). She asks him: “And this one? Shall we store it now or not?”</li> <li>6. D picks up another pyramid from the floor and puts it into the toy truck (<i>canonical use</i>).</li> <li>7. M keeps on offering the tube. She attracts the attention of D calling him by his nickname “Titi” (‘ti.ti).</li> </ol>
	<ol style="list-style-type: none"> <li>8. D picks up from the floor a washing liquid dosing ball that was there casually.</li> <li>9. M says: “That is the dosing ball of the washing machine! Hey!” D leaves the dosing ball on the floor. M says: “Yes, that one goes aside” (<i>positive evaluation</i>). M offers D the tube and asks him: “This one... What shall we do with it?”</li> </ol>
	<ol style="list-style-type: none"> <li>10. D grabs the tube and tries to put it inside the washing liquid dosing ball.</li> <li>11. M laughs and says: “What did you come up with? (...) Very good! Yes, they fit in some way...” (<i>positive evaluation</i>).</li> <li>12. D puts the tube into the dosing ball (<i>metacanical use</i>). He shakes the <i>tube-dosing ball complex</i> 7 times.</li> <li>13. D tries to take the tube out of the dosing ball, without achieving it. He shakes the complex three times while vocalizing and moving his head. M imitates D.</li> <li>14. D manages to uncouple the tube and the dosing ball. Then, he couples and uncouples them again (<i>metacanical uses</i>).</li> </ol>

Notwithstanding, the child persists in establishing a link between the tube and the dosing ball. To this end, the child practices placing the first object inside the second one. This innovation involves what we call metacanical use, that is, a creative use of an object that, albeit it does not fit the function it has in everyday life, exhibits

effectiveness. Here, even though the dosing ball is not commonly used as a container of tubes or solid substances out of the laundry context, it can perform that function effectively if it is creatively used. Two indicators corroborate the importance of this action on the part of the child. First, the mother characterizes the creative use of the dosing ball as a discovery of David's invention ("What did you come up with? Yes, they fit in some way"). Second, David does not remain indifferent to the achieved combination. On the contrary, he repeatedly shakes the tube-dosing ball complex to one side and the other, laughs with intensity, vocalizes, emits rising screams in a high-pitched vocal range, and accompanies all these reactions with synchronized body movements. These behaviors could indicate a level of excitement caused by the innovative use of the dosing ball. It is important to note one more fact that is not visible within the duration of this observation. Once the child combined the tube and the dosing ball, he undid and recombined the two items again and again. From the end of the observation to the end of the video, the child does this seven more times. This suggests the child's achievement has reached a certain degree of cognitive stability.

### General Discussion and Conclusions

Within cognitive psychology, a group of theories (including CMT by Lakoff and Johnson) rests on the assumption of existence of image schemas. They are, certainly, very powerful structures: they are basic (primitive), they are acquired directly through individual action, and they are obvious. They also structure our perceptual experience, help us to understand abstract issues and to attribute meaning, and guide our action in the world. They are so central to cognitive theories that, without them, complex psychological functions could not exist, because they are a continuation of these basic image schemas. From the sociocultural and developmental perspective we defend, we have drawn attention to this theoretical construct, and to the developmental gap it supposes. We have distinguished, within this gap, two big problems.

The first of them relates to the genesis of image schemas. We have sustained that, from a developmental point of view, it is indispensable to discuss the ontogenetic trajectory that allows for the emergence of these structures. Considering that these powerful structures are innate or depend on the direct action of an individual on a transparent world supposes a reductionist approach. We have proposed to consider image schemas as a possible developmental achievement and not an a priori condition, and we have argued that the image schemas, abstract in nature, do not exist in early childhood and cannot be understood in more advanced stages of development without resorting to prelinguistic semiotic systems. The second problem is linked with the genesis of cultural conventions. If image schemas are directly connected with language, we wonder *how* they do it. In what way are these simple, basic, and nonconventional structures related to the most conventional semiotic system we humans use? A purely embodied approach that excludes culture cannot answer this query.

The *pragmatics of the object* has an answer. The child does not acquire object use conventions spontaneously, but in a gradual way, thanks to the semiotic mediation of other subjects and communication about and through objects they foster. For the *pragmatics of the object*, the focus must be placed on the semiotically mediated action in triadic interactive contexts (adult-object-child). Thus, children would not interact in early childhood with generic schemas that have built-in logics emerging primi-

tively from recurrent action, but with particular objects whose uses are in construction processes within communicative situations. We have supported this assertion with evidence coming from investigations in typical and atypical development, and in Infant School 0–2.

The quantitative and qualitative analyses of the video suggest, on the other hand, that in early childhood there is no ideal CONTAINER structure, but very dissimilar objects that, despite the fact that they are all used in some way as containers, present very diverse use (pragmatic) possibilities. That is why the interactions of David and his mother around different CCAs and the types of uses and gestures they perform around them do not occur with equal probabilities. The rejection of these normality hypotheses and the great discrepancy in the quantity, duration, and types of uses and gestures that condense around the different particular container objects suggest the possibility that there is not a unique and universal imagistic structure that conducts action<sup>10</sup>. CCAs are different and are used with dissimilar degrees of semiotic complexity to fulfill different functions, and for different amounts of times. Besides, we have registered that containers are not always used *as containers*. They can, for instance, be used (when closed) as surfaces on which to percuss (rhythmic-sonorous uses). This fact proves that object and object use do not coincide [Moro & Rodríguez, 2005]. The first is a condition of possibility of the second, but not a sufficient condition. The function of objects is construed by children during ontogenesis through their participation in triadic experiences where semiotic mediation processes are put into play.

Embodied theories, in postulating that image schemas are formed directly through our experience in the material world, present difficulties for explaining any use other than the canonical one<sup>11</sup>: why do children not always use containers as containers if they already have a generic conceptual structure about them? Why, in Infant School, does there exist a discrepancy in the development of the actions of *taking* and *storing* objects from/in containers? If image schemas derive from the primitive experience in the world (as Lakoff and Johnson propose), then they should be a basic and obligatory conceptual interface through which to see the world. To say otherwise would require postulating that other mechanisms are in charge, for example, of activating and deactivating image-schemas depending on the context. This would be a nonparsimonious solution<sup>12</sup>, inconsistent with the empirical data we have analyzed. In Table 8 we summarize and compare the proposals of CMT and the *pragmatics of the object* about “container.”

<sup>10</sup> An innatist could propose that there is an innate basic CONTAINER concept that, through learning processes, is extended to new objects and situations. If this were the case, it would be necessary to explain the characteristics and magnitudes of these learning processes. In addition, it would be necessary to provide reasons to support the prevalence of an innate structure despite such learning processes.

<sup>11</sup> This problem also affects, directly, the Gibsonian theory of affordances. For a discussion, see Rodríguez [2006].

<sup>12</sup> It could be argued that our proposal, based on triadic units of analysis, is less parsimonious than that of embodiment, based on the dyadic unit of analysis *subject-environment*. This is a complex epistemological discussion. From the *pragmatics of the object* it is not possible to study the construction of thought without considering triadic processes of semiotic mediation from the beginning of life. Choosing another unit of analysis would denaturalize the object of study. We argue that embodiment is less parsimonious because the activation-deactivation mechanisms that would become necessary exceed the unit of analysis that the theory itself judges as sufficient to explain human cognition. They would, then, be extra elements. This addition would require theoretical and empirical justification. Meanwhile, the importance of semiotic mediation has already been firmly established within the cultural tradition of psychological studies.

**Table 8.** Comparison of the proposals of CMT and the *pragmatics of the object* about “container”

	CMT/embodiment	Pragmatics of the object
What is a <i>container</i> ?	An image schema (i.e., an embodied, basic, obvious and primitive mental structure)/a <i>hidden conceptual mechanism</i>	A particular object that can be (protocanonically/canonically/metacanonically/symbolically) used to contain other things
What is the condition of possibility of <i>container</i> ?	CONTAINER arises from the direct and recurrent action of subjects in a transparent world Subjects naturally learn the logic of containment	The semiotic, pragmatic, and cultural construction of the objects’ containment function that takes place in triadic interactions (i.e., as <i>object</i> and <i>use of the object</i> do not coincide, a cup is not a natural container but a cultural one)
What is <i>containment</i> ?	A built-in logic of the CONTAINER image schema It comprises three elements: (i) <i>interior space</i> , (ii) <i>boundaries</i> , (iii) <i>exterior space</i>	A possible function of some objects As a function, it is culturally defined and constructed
What is the <i>container</i> abstraction level?	CONTAINER is (pre)conceptual, general, and universal It is topological, and it is structured in logical terms	Containers are, in early childhood, particular and concrete objects There is not a CONTAINER universal structure Image schemas may be a later cognitive construction
What are the effects of <i>container</i> on human cognition?	As an image-schema, CONTAINER organizes and unifies our perception of the world and our actions in it	As there are different containers, with different pragmatic possibilities, our perception of the world and our actions in it are not unified, but very dissimilar

Our results credit the idea that to understand metaphorical thought it is not necessary to postulate the existence of image schemas, but to consider the particularities of specific objects (for example, container objects) and their functional uses, and the contexts where they are used. In these contexts there are others, there are intentionalities, and there are very complex communicative resources that unfold through different semiotic systems. As we have held before, we believe metaphorical thought is not based on a rational capacity to form categories from immediate experience with the world. Instead, it is one semiotic operation that allows the child to distance him or herself from a relatively literal world, to immerse himself in a complex and interpretive semiotic universe [Alessandroni, 2016]. This perspective, consistent with the material-cultural turn in developmental psychology [Moro, 2016; Rodríguez, 2006; Rodríguez & Moro, 1999], invites us to consider materiality and their cultural crossings as the grounds on which subjects, within triadic interactions, construe new semiotic operations upon which the adult metaphorical thinking is rooted.

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