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A Phenomenological-Hermeneutic Analysis of Experimental Infant Research

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A PHENOMENOLOGICAL-HERMENEUTIC ANALYSIS OF EXPERIMENTAL
INFANT RESEARCH

A Dissertation

Submitted to the McAnulty College and
Graduate School of Liberal Arts

Duquesne University

In partial fulfillment of the requirements for
the degree of Doctor of Philosophy

By

James L. Yu

December 2009

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James L. Yu

2009

A PHENOMENOLOGICAL-HERMENEUTIC ANALYSIS OF EXPERIMENTAL
INFANT RESEARCH

By

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Approved November 17, 2009

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ABSTRACT

A PHENOMENOLOGICAL-HERMENEUTIC ANALYSIS OF EXPERIMENTAL INFANT RESEARCH

By

James L. Yu

December 2009

Dissertation supervised by Eva Simms, Ph.D.

This project challenges the dualistic conceptions in infant research literature by reexamining a collection of infant research records from a phenomenological, non-dualistic perspective. Grounded in the recent convergences between phenomenology and cognitive sciences, this project utilizes a combined phenomenological-hermeneutic method. This model of analysis is applied to three major areas in infant research: physical knowledge, memory-based learning, and social behaviors. The primary pool of data is drawn from written research records from both primary and secondary sources. To reinterpret empirical findings the analysis includes a systematic reexamination of the ontological presuppositions of infant researchers/scholars, and a reflective, experience-near approach. The author attempts to deconstruct reified concepts and concretize theoretical abstractions that have been used to describe and interpret experimental

observations reported in the literature. Accordingly, the conceptual framework of this project is founded on several phenomenological notions that seek to transcend dualism: phenomenal world, lived-body, and intersubjectivity.

The first part of investigation demonstrated that subject-object dualism has had a major impact on contemporary conceptions of infants' object/physical knowledge. In turn, it was shown that a unified subject-object view of perception can allow for a non-conceptual perspective on the infant's understanding of the physical world; specifically, the permanence of objects and other physical principles are abstract descriptions of what are already implicit in the infant's lived-world. Second, the lasting influence of mind-body dualism was revealed through a critical re-reading of the research studies concerning memory-based learning behaviors. Based on the idea of intelligent action without representation, several experimental studies were reinterpreted in order to capture the immediacy of infants' coping behaviors. Lastly, the prevalence of the self-other ontological separation in the research literature was shown through a systematic reexamination of the research on infants' facial perception, imitation, and social intentionality. In addition, it was demonstrated that the rationale underlying the thesis of a "discriminatory consciousness" and self-and/or-other representations can be effectively deconstructed through a phenomenological re-reading of some of this supporting empirical evidence.

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I would like to thank my readers, Dr. Connie Fischer and Dr. Paul Richer. Connie has been a major mentor throughout my graduate training at Duquesne, supporting wholeheartedly both my clinical and academic work. Connie's emphasis on expressing phenomenological thought descriptively and succinctly has had a lasting influence on my approach to academic writing. Paul's interest in experimental research and his introduction of Merleau-Ponty's *Structure of Behavior* in a class laid the foundation of my own interest in similar lines of work. His systematic presentation of some complicated concepts in phenomenology helped me to digest these materials despite the language barrier during my early training. I especially appreciate both Connie and Paul's efforts in supporting my applications for a teaching position in Hong Kong.

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Chapter 1

Introduction

1.1 Backgrounds

The development of experimental infant research over the past century has given rise to a handful of scholarly investigations about the nature of the infant's world. Stern (1985) called these “inferential leaps,” which are often considered to be a prohibited intellectual activity in the mainstream of academic psychology. Nevertheless, psychology is fundamentally a meaning-making profession—collecting data and reading into their broader meanings are inseparable. Thus, we continue to witness psychological investigations that go beyond brute quantitative data or raw experimental observations.

In particular, some of these efforts have been praised for achieving a high level of theoretical sophistication and structural coherence (e.g. Beebe & Lachman, 2002; Jacoby, 2001; Maurer & Maurer, 1988; Rochat, 2001; Sander, 1977; Stern, 1985). These interpretive inquiries are founded on an attempt to merge psychological theories with empirical evidence in infant research. These scholars all consider their work as a catalyst in a never-ending dialogue about the fascinating world of infants. Psychological research at this level is essentially interpretive and discursive—a hermeneutic and dialogical “human science” (Dilthey, 1883/1989) grounded in empirical evidence.

The current project is also situated in this ongoing, historical dialogue. Unlike most of the former studies, however, it focuses on the level of ontology or the dimension

of being and existence. Accordingly, this project is concerned with the structures and meaning of human existence, and takes issue with the basic terms and constructs in infant literature that carry controversial ontological implications (e.g. mind, self, body, others, and objects). In the philosophy of psychology, Merleau-Ponty (1962, 1964, 1965, & 1968) is an emblematic pioneer in this line of research. Most of his works can be characterized as a rigorous reexamination of empirical findings from a variety of scientific disciplines. Over his very productive career, he successfully laid out the foundation of a post-Cartesian, nondualistic ontology. In psychoanalysis, too, some contemporary scholars are beginning to recognize the importance of ontology in psychological interpretations—particularly, the inaccuracy of Cartesian dualistic conceptions (e.g. Aron, 1996; Stolorow et al., 2002).

Through a systematic reexamination and review of selected literatures based on a hermeneutic-phenomenological interpretive method, this project seeks to provide a nondualistic perspective on several major topic areas in infant psychological research: physical knowledge or understanding, learning and intelligent behaviors, social and interpersonal functioning. The primary pool of data comes from the written descriptions and the conceptual interpretations of infant behaviors available in research experiments. For this dissertation, research excerpts were collected from both primary and secondary sources. The latter is limited to a small number of seminal works, each of which includes an extensive review of the most significant studies in infant psychology.

The Cartesian bifurcations of human existence inevitably lead to a vision of the self that is bounded, masterful, interiorized, and autonomous—which, at its core, is inhabited by Western ideologies (Cushman, 1991). How exactly does Cartesian dualism

influence the literature of infant research? In order to address this question, the current project pays special attention to three particular dichotomous ontological themes: subject-object bifurcation, mind-body split, and self-other separation. Alternatively, the reexamination is guided by the core nondualistic ontological propositions in Merleau-Ponty's philosophy: the phenomenal world or "lived-world," embodiment or "lived-body," and intersubjectivity or intercorporeality.

1.2 Conceptual Framework

An Ontological Emphasis

Technically speaking, psychology regularly steps into a branch of metaphysics known as ontology, because it involves theoretical and conceptual explorations that provide implications about the following questions: What is there? What is a subject? What is an object? What is existence and how is it defined? What are the relations between the subject and the object, the mind and the body, the self and others? Evidently, academic psychology has always participated in conceptualizing human realities, explicit or implicit, and its intricate relationship with ontology cannot be overlooked.

Ontological studies concern the nature and relations of being, and thus, the question of how reality is experienced by humans. It is not difficult to see the ontological underpinnings in psychological literature—from how a phenomenon is broken down into separate but interacting objects, to how these objects are related to the observer studying them. Nevertheless, it takes a disciplined scholarly effort to systematically explicate these ontological claims, which is a major goal in the current dissertation; no standardized experimental methods and statistical analysis can do this trick!

Every theoretical account of infancy is an anthropological portrayal of human

beings in the earliest developmental stage, and every conceptual interpretation of infant behaviors in experimental settings is founded on an implicit ontology. It is impossible to describe or interpret human behaviors without an ontological framework. In some cases, a whole discipline of knowledge is built upon a specific ontology. Thus, ontology is the ultimate ground for the so-called theoretical presuppositions, preconceptions, and assumptions.

In infant literature, the “inferential leaps” (Stern, 1985) occur at both theoretical and ontological levels. Theoretical conceptualizations not only construct a vision of human being (anthropology), but also reveal an array of ontological commitments. To a certain extent, some critical infant scholars (e.g., Rochat, 2001; Stern, 1985) have attempted to make ontology somewhat more explicit in their work. However, these issues have not been properly treated in the history of psychology

A Review of Relevant Literature

Theorizing about the infant’s world might be an intellectually-stimulating activity for many psychologists. Nevertheless, in order to create a coherent account of infancy, some scholars engage in an extensive and painstaking analysis of research records. Maurer and Maurer (1988) and Rochat (2001) are two successful examples, as their respective works on infancy have been recognized for achieving a high level of internal coherence in their arguments. In the broad and diverse field of contemporary psychoanalysis, a number of notable scholars/researchers have also made remarkable contributions to infant psychology through bridging psychodynamic theories with empirical findings (i.e., Sander, 1980; Lichtenberg, 1983; Stern, 2000; Beebe & Lachman, 2002). Jacoby (1999) has also attempted to bridge infant research with Jungian analytic

theories.

In the past few decades, contemporary psychoanalysis has experienced an abrupt awakening about the inaccuracy of an intrapsychic model of the mind, which, needless to say, is Cartesian by default (Stolorow et al., 2002). Beebe and Lachman (2002) propose a “system view” of infant’s consciousness where the newborn and the mother continually and mutually regulate the psycho-affective states of each other. Similarly, Stolorow et al. (2002) puts forth the idea of an “intersubjective field,” suggesting that infants from the very beginning participate in a nondualistic world with their mothers. These ideas resonate with Donald Winnicott’s famous saying that the infant does not exist as an isolated being, and her existence can only be understood as a mother-infant unit.

On the border between psychology and philosophy, Knowles (1986) demonstrates how developmental psychology could be understood from a human-science framework, through a careful reexamination of Erikson’s stages of development from the perspective of Heidegger’s existential-phenomenology. Gallagher (2002) suggests that phenomenology has a very strong appeal to the interpretation of scientific findings. In light of the groundbreaking research in infant psychology, many scholars with both philosophical and psychological backgrounds have also attempted to investigate different aspects of the infant’s world from a phenomenological-hermeneutic perspective (e.g., Gallagher & Meltzoff, 1966; Simms, 1993, 1994, & 1999; O’Connor, 1986; Wiggins, 1979).

Furthermore, the psychological relevance of Merleau-Ponty’s philosophy is well-documented. For instance, Dreyfus (1972, 1986) and Gallagher (2005) have attempted to bring Merleau-Ponty’s notion of the “lived-body” into a refreshing dialogue with

cognitive sciences and neurosciences, providing a new understanding of complex phenomenon such as phantom limbs, unilateral neglect, and the construction of artificial intelligence. In 1996, Shaun Gallagher collaborated with the world-renowned infant researcher, A.N. Meltzoff, in a combined effort to reexamine Merleau-Ponty's ideas on the infant's sense of self and others. Evidently, Merleau-Ponty's revolutionary contributions to infant psychology are uncontested (Hoeller, 1993).

Conceptual Foundations

As previously discussed, there are several ontological notions proposed by Merleau-Ponty that serve as the conceptual foundation in this dissertation: the phenomenal world/lived-world, intersubjectivity/intercorporeality, and embodiment/lived-body. It is absolutely imperative that these notions are viewed as fundamentally ontological rather than theoretical concepts, given that all theories are grounded in ontology.

Nevertheless, these notions are not completely foreign to the tradition of developmental psychology. For instance, emphasis on the fundamental relatedness between the organism and its surroundings can be traced back to Heinz Werner's "organismic approach" to human development. According to this approach, development refers to changes of structure, proceeding from "a state of relative lack of differentiation and to a state of increasing differentiation and hierarchic integration" (Werner & Kaplan, 1956, p.866). Differentiation is the process through which a global whole, or an undifferentiated unit, progressively branches out into assorted units with specific functions. These units are not isolated from one another, but "hierarchically integrated" as a whole: all units function as a complex system, in which the higher regulating units

always take control over the lower ones. This model of human development is known as the “orthogenic principle,” which operates in many developmental domains. In the psychological domains, the implication of the orthogenic principle is remarkably profound. For instance, it would challenge the idea of a unified self because our self-consciousness might also begin in a state of relative undifferentiation between self and others.

Some of Werner’s developmental notions carry tremendous implications for our understanding of the infant’s world. For instance, the notion of microgenesis suggests that perception unfolds in the exact same sequence of human development from relative undifferentiation to more differentiation. Physiognomic perception characterizes the most fundamental level in which the human organism perceives the world: perception is fused with sensations, feelings and actions, and thus, things originally appear as full of life and emotions. Next, we will further elucidate the notions of the phenomenal world, the lived-body, and intersubjectivity, in Merleau-Ponty’s philosophy.

The Phenomenal World

The phenomenal world refers to the primordial relatedness between human beings and the world; it is a notion that radically challenges the Cartesian subject-object and inner-outer distinctions. The world is simultaneously immanent and transcendent—everything we perceive is “in-itself-for-us.” Every presence trails a past and portends a future; thus, there is a thickness in each passing moment. Through a phenomenological reflection on the crisscrossing/reversibility between the subject and the object, Merleau-Ponty (1962) attempts to deconstruct the subject-object dichotomy:

This subject-object dialogue, this drawing together, by the subject of the meaning diffused through the object, and by the object, of the subject’s

intentions—a process which is physiognomic perception—ranges round the subject a world speaks to him of himself, and gives his own thoughts their place in their world” (p.152-153).

Merleau-Ponty’s phenomenology is also characterized by a return of the body into philosophical and psychological discourses. Not long before him, Edmund Husserl considered consciousness in terms of intentionality which is always directed to the world. For Merleau-Ponty, however, intentionality is not understood in terms of a transcendental ego as Husserl suggested, but of a total bodily engagement and anchorage in the world. The body is the primary medium through which the subject knows the world, but they are never separated ontologically. The embodied subject simultaneously inhabits a world and is inhabited by it. This conception of an intermingled, double inhabitation is a paradox that has no place in Cartesian dualism. At the end of his career, Merleau-Ponty (1968) invented the metaphoric notion of the “flesh,” which refers to an “element” that highlights the intertwining between the self and others, as well as the subject and the objects.

The Lived-Body

Embodiment has a variety of definitions across different fields of study. Here, the term is founded on Merleau-Ponty’s notion of the “lived-body,” which is a counterclaim to the radical split between the Cartesian disembodied mind and the purely materialistic, mindless body. In his ontological elucidation of human embodiment, Merleau-Ponty took on a few empirical phenomena—namely, infant’s pointing and grasping, double-sensation, and the phantom-limb, and revealed their ontological implications for the human body.

From a phenomenological perspective, the body and the mind are not separate

entities, but different orders of a singular structural unity. Merleau-Ponty (1964) argues that terms such as perception, phenomenon, or experience, already presuppose a body. The body is the ultimate ground of reference for perceptual experience. Having a body is equivalent to having a world: to be embodied is to be in the world and of the world. Hence, the body is a part of the domain it surveys. The relation between the body and space is captured by the notion of “lived-space.” According to this idea, space is already pregnant with both potentials and limitations of motor projects, which is the foundation of a primordial sense of “I can” or bodily intentionality already operative during early infancy. In addition, through a painstaking analysis of a patient’s disability resulting from a severe brain injury, Merleau-Ponty (1962) shows that the structural re-configuration of the body would bring about corresponding change in the lived-world.

In the same vein, Werner (1948) posits that infants hardly experience an outside world differentiated from their own immediate actions, sensations and feelings/emotions. Infants and young children experience the world at the “sensori-motor-affective” level of perception, which is characterized by two perceptual mechanisms: physiognomic perception and intersensory experience. Physiognomic perception implies a syncretic unity between the embodied subject and the world of objects, which is present already at birth. Intersensory experience points to the syncretic unity of senses, suggesting that human perceptual modalities begin altogether as a relatively global unit. Accordingly to Werner, too, the infant’s body is understood as an embodied subject inherently intertwined with the world.

Intersubjectivity/Intercorporeality

In both philosophical and psychological literatures, intersubjectivity also has a variety of definitions. In psychotherapy, intersubjectivity is often defined as the “interplay between two subjectivities,” a field theory that conceives therapeutic phenomenon in terms of the co-construction between the therapist and the patient (Stolorow et al., 2002). It is also commonly known as a “two-person” model of psychology. In psychological research, intersubjectivity is treated somewhat as a measurable variable. In developmental psychology, it is often referred as the earliest form of pre-linguistic communication—a developmental achievement divided into “primary” and “secondary” stages (Trevarthen, 1978, 1979).

In philosophy, the history of the term intersubjectivity can be traced back to Edmund Husserl, who proposes that “the meaning of the term 'man' implies a reciprocal existence of one to the other, hence a community of men, a society” (1970, p.104, original italics). This notion of “transcendental intersubjectivity” refers to the primordial, pre-verbal, and pre-reflected sense of others. Ortega y Gasset (1957), following Husserl, introduces the idea of “*compreence*,” which describes an intrinsic awareness of others regardless of whether they are present in our immediate perception.

Intersubjectivity is the ontological counterclaim to the Cartesian isolated mind, or the radical self-other split. Most fundamentally, intersubjectivity suggests that the primordial context of human existence is a communal world. Others are experienced originally as animate organisms like oneself. The intersubjective context of the infant’s existence is characterized by what Merleau-Ponty (1964) called the “syncretic sociability,” which points to an anonymous communal world prior to the distinction of perspectives—

what is mine and what is the other. This particular theme has evoked some interesting debates in psychology (e.g., Stern, 1986; Gallagher & Meltzoff, 1996). Nevertheless, the point taken is that there is no demarcation between the world an infant owns and privately experiences, and the world she exists as an object of others' intention. Instead, infants are born into an "anonymous collectivity" or an "undifferentiated group life" (Merleau-Ponty, 1964, p.119). Intersubjectivity speaks to the ontology of human conscious existence: we are at the same time the subject and the object, and the social world and us inhabit each other. As Merleau-Ponty suggests, "the subject is his body, his world, and his situation by a sort of exchange" (p.72). Diamond (1996) also speaks to this double inhabitance: "The individual lives in a multipersonal field and conversely this inhabits the individual" (p.305).

All of these ideas suggest that the infant's body is not only a biological entity, but is also fundamentally intertwined with the social environment. The infant's existence is interwoven with the existence of others in a *multi-personal* field. The notion of intersubjectivity, however, is not based on the interaction of isolated minds. According to Merleau-Ponty (1964), the infant's intersubjective existence must be understood in her embodied situation, based on the transfer of corporeal schemas. Hence, the foundation of intersubjectivity is "transitivism" or the "immediate assimilation of others' experience and the infant's own" (p.135).

1.3 Research Questions

There is no doubt that infant research has tremendous practical implications for child-rearing, daycare, education, nursing, medicine, business, and even public policies. However, Bruner (1999) has documented some misuses and misinterpretations of

experimental findings in developmental psychology, showing that empirical evidence without careful interpretations could be very counterproductive¹. Thus, an unreflective and uncritical attitude is contradictory to the core ethical principle in psychology—that is, taking the well-being of people as its best interest.

Given that theoretical propositions and models are built upon an implicit ontology, it is not difficult to imagine how an underlying ontological framework could give rise to a whole discipline of knowledge and professional practices. For example, it has been noted that Cartesian dualism had a major influence in traditional Western medicines (Duncan, 2000) as well as atomic physics. Even though Cartesian dualism has been characterized as “the cancer of all psychology” (Binswanger, 1963), its remnants continue to prevail in highly disguised forms in the literature today.

Accordingly, most contemporary psychologists do not identify themselves as followers of Cartesian dualism. Nevertheless, ontological reflection is not a major part of the regular routine for psychologists. Hence, dualistic thoughts are more or less invisible even to the critical eyes of a well-trained psychologist. Whereas contemporary psychologists have generally been well-trained in critical thinking, it does not necessarily translate into an awareness of how their understanding/knowledge of psychological phenomena, in both written and verbal forms, might have been colored by Cartesian thoughts.

This project is founded on a strong interest in conceptualizing the tightly-webbed relationship between the infant and her world. Based on a critical and reflective approach to the subject-object, the mind-body, and the self-other bifurcations in Cartesian dualism,

¹ Bruner (1999) mentions multi-million dollar businesses under the name of science, such as baby-training institutes, as an example.

the focus is on the infant's relationship to her own body, physical objects, and other animate beings. Correspondingly, the following questions are being asked:

1. How do infants understand the ways in which physical objects behave and interact with each other in space?
2. How do infants engage in bodily actions or motor projects that indicate learning and intelligence?
3. How do infants perceive the social features in their surroundings, and what can be learned from their social behaviors?

1.4 Methods

Merleau-Ponty (1965) argues that traditional scientific psychology is “in no position, with its more restricted methods, to examine carefully and critically” (*Preface*, Xiii) the ontological assumptions in infant research literature. The current dissertation, with its ontological emphasis, calls for a methodological corollary in the “human-science” psychology (Dilthey, 1883/1989)—that is, a phenomenological-hermeneutic interpretive approach to experimental research records.

Human-science research respectfully approaches the uniqueness of human subjects (Fischer, 1998). Psychological matters are understood in a holistic, integrative manner: the interweaving of symbolic, interpersonal, bodily dimensions of human experience (Barton, 2000). Today, human-science psychological research involves existentialism, phenomenology, and a variety of hermeneutic frameworks, such as post-structuralism and constructivism. It seeks to explore the meaning of—rather than taxonomize—psychological phenomena; it also attempts to reveal the structures of lived-experience, rather than to explain isolated behaviors and thoughts in casual and probabilistic terms (van Manen, 1990, p.4).

Infant research opens up a new avenue for phenomenology, because it provides invaluable qualitative data for interpretive work. The simplicity of newborns' behaviors often presents a challenging and uncomfortable task for research scientists to categorize them into more complicated theoretical constructs. As a result, compared to the psychologists who study older age groups, infant researchers demonstrate a stronger commitment to provide detailed contextual descriptions of behavior. These written records also involve the researchers' own theoretical commitments and the associated ontological implications. Thus, infant research offers a vast pool of data that is extremely appealing to the phenomenological-hermeneutic approach to psychology.

The phenomenological-hermeneutic method seeks to enrich scientific observations of human behavior. Findings from such an investigation are not scientific in the traditional sense. The investigator holds the epistemological stance that he or she is never neutral; facts are never separated from human observations and interpretations, and understanding is a dialogic process involving multiple perspectives. Let us take a closer look at both methodological counterparts in the current project.

Phenomenology

Merleau-Ponty (1962) describes phenomenology as a return to the world prior to any scientific/theoretical abstraction, the primordial lived-world of which science always speaks. Accordingly, one major step in phenomenological research is to "bracket" or "deconstruct" these abstractions and constructs. Phenomenological research always begins with the "first-order" lived-world prior to any scientific abstractions. The conception of knowing or researching something is not based on "the myth of a neutral observer" (Stolorow & Atwood, 1992), which suggests a detached researcher gathering

and analyzing objective data in the outer, real world.

There are many variations of phenomenological research, and their focus ranges from “lived-experience,” “structures of consciousness,” “Husserlian essences,” meaning-units, to “unconscious organizing principles” (Stolorow, 1992). Regardless of the emphasis, most phenomenological researchers share a fundamental sensitivity toward their own presuppositions, and adopt a wholistic, part-whole model of epistemology (Giorgi, 1986, p.7). Thus, phenomenology is inseparable from “human attitudes” (Merleau-Ponty, 1965, p.9). However, it is not based on wild guesses or theorizing because it “has never given up its [close] contact with facts” (p.10).

According to Merleau-Ponty (1962), the ultimate goal of phenomenology is to create or rediscover a new ontology that properly describes the primordial experiential world, without reducing the vicissitudes of human experience into theoretical abstractions and reified constructs. Knowledge is acquired through an ongoing cross-examination between new ideas or insights and a forever-growing pool of empirical evidence. Thus, phenomenology can be viewed as the resurrection of a closed ending and the initiation of a new beginning. It does not seek to provide an all-encompassing answer that puts an end to future inquiries. Rather, the mission of phenomenology is to offer a different perspective in which both new answers and further questions can emerge. Merleau-Ponty has always been an advocate for a tight connection between phenomenology and developmental research, and his work has been described as the “ontogenetic investigation that is the phenomenological counterpart of developmental psychology” (Dillon, 1997, p.119). Simms (1993) also suggests that a phenomenological reflection on

developmental research makes a clarifying contribution to the understanding of the experiential world of young children.

Hermeneutics

Hermeneutics is often considered as the counterpart of phenomenology. Historically, hermeneutics is usually referred to the art of interpretation of religious texts, but its scope in human-science research extends far beyond the religious and classic meanings of texts. Today, hermeneutics is viewed as an approach to anything that is subjected to interpretations. Woolfolk et al. (1988) discuss three kinds of hermeneutics: methodological, ontological, and critical. The nature of the current dissertation is closest to “ontological hermeneutics” (p.4), which emphasizes understanding and seeks truth that is foundational to all theories and interpretations.

In Merleau-Ponty’s work, hermeneutics is definitely the methodological corollary of phenomenology. He calls this kind of research an exploration of the “lived world,” which requires both empirical evidence (e.g., research records) and intellectual-logical endeavors (e.g., reflections, interpretations, “bracketing”, etc.). Furthermore, hermeneutics can be conceived as an epistemological model as well: the acquisition of knowledge is a never-ending circular process, and is never based on the accumulation of facts (Gadamer, 1994). This process involves an ongoing dialogue between different perspectives; hence, knowledge is neither subjective nor objective but “inter-subjective.”

As discussed before, the current project is situated in a historical dialogue in infant psychology, and is open to feedback in any form (e.g., criticism, commentaries) and fundamentally responsible to answer them. The goal is to come up with new ways of thinking about the infant’s world that are observable and comprehensible by the readers.

Gallagher (2002) offers an excellent characterization of the role of an inquirer/researcher in such phenomenological-hermeneutic research: “We need to appeal to empirical verifications and clarifications that will confirm phenomenological insight, and then use that insight to interpret the empirical data—a hermeneutic circle, to be sure, but not a methodologically vicious one” (p.13).

Primary Data for Analysis

The expansion of infant-related research in the last several decades has produced an enormous pool of empirical data. It is impossible to incorporate its entirety into the current investigation. In the context of this project, however, it might be more beneficial to select the experimental studies that really “matter” to our ontological emphasis. Thus, a collection of studies has been selected based on an extensive literature review that involves some of the seminal works on infancy (i.e., Beebe and Lachman, 2002; Jacoby, 2001; Lichtenberg, 1983, Maurer & Maurer, 1988; Rochat, 2001; Stern, 1985). Most of these scholars have attempted to shed light on the infant’s sense of self, body, and social reality—hence, their descriptions provide important ontological implications for the current investigation. Interestingly, the empirical studies cited in these books overlap a great deal, showing that they are perhaps the most significant research experiments in the field.

Simms (1999) suggests that “the scientific descriptions of [infant’s] behavior are incomplete documents” or “second-order texts” (p. 322), which should be critically and reflectively reexamined for their first-order experiential relevance. Written records of infant research not only provide “incomplete” behavioral descriptions, but also linguistic

traces of the researchers' own ontological convictions. Both are invaluable data for the current investigation.

Phenomenological-Hermeneutic Analysis

How does a phenomenological-hermeneutic interpretive approach to psychological studies differ from other typical, logically-sound interpretations? And, why is it better? These questions might not have been directly and explicitly addressed before, but the answer is encrypted in the writing of Merleau-Ponty (1962, 1964, 1965, & 1968) who is well-known for his inclusion of experimental research in philosophical reasoning. In order to better explain the sophistication of the phenomenological-hermeneutic interpretive method, it might be helpful to offer a description of the major methodological procedures that Merleau-Ponty undertook in his work. In the following, these procedures are discussed in reference to the current project:

1. Examine and reflect on the nature of "research data"

Written records of infant research provide two kinds of data:

- a) Descriptions of original experimental observations
- b) Theoretical interpretations offered by scholars/researchers

Although both kinds of data are often presented together in a coherent paragraph, it is important to distinguish the pure behavioral descriptions (for reinterpretation), from the theoretical or conceptual interpretations (for reexamination).

2. Data Analysis based on the phenomenological-hermeneutic method

- a) Every interpretation or conceptualization has an internal logic, which might be explicit or implicit. Such logic can be made explicit by spelling out how researchers go from experimental observations to the making of an argument or statement.
- b) Scan for theoretical abstractions or constructs, which will then be "bracketed" for reflection and/or "deconstruction." The phenomenological reflection makes explicit the experiential world prior to scientific abstractions or conceptions, whereas "deconstruction" takes apart reified constructs and disempowers their status of representing the real.

c) This project has an ontological emphasis, so the next step is to reveal the ontological assumptions or convictions residing in selected literatures—making the implicit explicit, so to speak. Even if the investigator is in agreement with a particular research interpretation, it is important to spell out its ontological implications.

d) In reexamining infant research records, the investigator articulates an alternative perspective and makes explicit its underlying ontological framework.

e) The investigator engages in a circular, hermeneutic re-reading of all selected written records. Rather than strictly reporting one's conclusions, an effort is made to spell out the progression of his/her reasoning or thinking.

3. Pending practical feasibility, the investigator makes an effort to address input from others (in this case, my director and readers). This step might not take place until toward the end of the project.

1.5. Validity

The phenomenological-hermeneutic method is not a form of subjective introspection. Its “search for validity goes beyond a mere return to subjectivity and personal explorations of one's private experience” (Simms, 1999, p.304). What does validity mean in this dissertation then? Given that it is situated in a historical dialogue about the world of infants, it might be helpful to find out how some of the former participants understand validity in their works.

Stern (1985) attempts to form a bridge between psychoanalytic clinical theories and infant research, in order to resolve “the contradiction between theory and reality [or empirical findings]” (Preface, ix). This contradiction explains why there is such a rigid division between empirical researchers and theoretical psychologists. According to Stern (1986), such tension can only be resolved by someone who is “bilingual”—both well-versed in theories and knowledgeable of infant research. Accordingly, validity can be evaluated by the structural coherence of a theoretical-empirical account. Rochat (2001) conceives his account of the infant's world as a kind of “story,” and its success is

measured by the extent to which it stimulates curiosity and a sense of wonderment in the readers. Validity can be examined by the coherence of such a story, and the reactions it receives from the audience. In addition, validity can also be evaluated by means of the goals of a project. For Stern (1985), the clinical relevance and utility of his developmental account of the infant's sense of self is among his top goals in his work. Thus, its validity can be examined by the extent to which the goal is accomplished.

To sum up, validity in the current project can be evaluated in several ways. First, given that this dissertation will provide a narrative of infancy, the structural coherence of this "story" represents one dimension of validity. Second, the extent to which this project can capture the attention and stimulate the wonderment of readers is viewed as another dimension of validity. Finally, the validity of this project can also be judged by whether or not the goals have been successfully attained.

It is important to note that the current project itself is dedicated to examine the validity of the Cartesian dualistic ontology—and alternatively, it seeks to provide a post-Cartesian, nondualistic framework for understanding the experimental observations in infant research. Its own validity, then, can be evaluated by the extent to which it can efficiently account for the empirical findings; provide a ground for new theories, explanations, and descriptions of psychological phenomenon; and, resonate with the readers' own personal experiences and observations. Such validity has been demonstrated in similar efforts undertaken by some of the most prominent phenomenological researchers (e.g. Dreyfus, 1972; Gallagher, 1996).

Chapter 2

Infant's Physical Knowledge: Overcoming Subject-Object Dualism

2.1 Introduction

Infant researchers begin their work by creating research questions and forming testable hypotheses. Nonetheless, these preliminary procedures already reveal an implicit ontological and theoretical framework prior to the actual execution of an experiment. For example, Rochat (2001) argues that “current infancy research is part of a tradition that is deeply rooted in Western philosophy, in particular the tradition of dividing mental life into separate arenas such as cognition, perception, motivation, attention, social behavior, emotions, or personality” (p.24).

Although it is rather difficult for a neutral observer to identify such “separateness” in infant's behaviors, such ontological presuppositions in infant psychology inevitably determine the ways in which infant's behaviors in experimental setting are conceived and interpreted. Cartesian subject-object dualism has a lasting influence in the infant psychological literature. The subject-object split is the foundation of the popular portrayal of a “rational infant physicist” in contemporary research literature (Rochat, 2001, p.24). The infant is viewed as a biologically premature scientist with an emerging mind, constantly attempting to decipher and identify the physical laws and patterns in the external world.

This cognitive camp in infant research often views the infant as “a patchwork of discrete abilities” (Simms, 1998, p.321). The infant’s inability to perceive and decipher the objects in the exact manner adults do is considered as somewhat of a flaw. This vision of infancy reveals a deeply-entrenched commitment to a notion of consciousness that is ontologically detached and independent from the object world. In turn, this idea of self-consciousness or an isolated mind has led many psychologists to bifurcate infant’s existence into dualistic and binary conceptions—namely, internal versus external, subjective versus objective, mental versus real, and so forth. How does this subject-object dualism influence our understanding of the infant’s physical/object knowledge in psychology?

In this chapter, our reflection on this question will be based on a phenomenological-hermeneutic analysis on three major research areas regarding the infant’s understanding of the object world: object permanence, object movement, and object categorization. To begin, we will re-read an extensive research excerpt of infant’s acquisition of object permanence provided by Maurer and Maurer (1988), which represents the general view of this developmental achievement in infant research. The concept of object permanence, nonetheless, will be revisited in the next chapter as well, when infant’s embodiment is taken into consideration. Then, we will engage in a thorough phenomenological analysis of the original drawbridge experiment and some of its follow-up studies, as well as another research experiment concerning the infant’s ability to perceive occluded object movements. Lastly, we will critically reexamine an experimental study on the infant’s ability to categorize objects.

To sum up, we will identify the remnants of subject-object dualism in the

researchers' explanations, examine the logic of their arguments, and unveil their associated ontological problems. In turn, we will seek to provide an alternative account that goes beyond the subject-object bifurcations in the literature, taking into consideration the aspects of an experiment that might have been overlooked and misunderstood by infant researchers. In other words, the comparison between dualistic and nondualistic understandings of infant's physical knowledge will be directly demonstrated through our systematic analyses of the selected research studies.

Whereas dualistic conceptions are the shared language for most infant researchers today, the nondualistic framework proposed in this project is somewhat foreign to many psychologists. Hence, it is important to elucidate on the fundamentals of a nondualistic perspective that attempts to transcend subject-object dualism in the literature. According to Merleau-Ponty (1962), the notion of the phenomenal world is central to this endeavor. Rooted in Cartesian dualism, the subjective world and the objective world are historically considered as mutually exclusive. The tension between the two terms has given rise to many psychological theories about the mind, because psychologists have been preoccupied with inventing some sophisticated mechanisms that would bridge these two ontologically-divided worlds. As a result, the majority of psychological theories are founded on the ontological bifurcation between the inner mind and outer world, or the constituting consciousness and external physical objects. The following description is a classical example of subject-object dualism in infant psychology: "infants are born perceiving and discriminating an 'objectified' world...furnished with physical objects and events that can be differentiated and specified" (Rochat, 2001, p.88).

The subjective world is associated with the sphere of interiority and immanence.

Physical knowledge is based on the immediate conscious experience of worldly objects—we come to understand objects as they are given to us in perception. Hence, objects in the subjective world are thus partial because they only exist “for us.” Furthermore, subjects and objects are considered as “internally related,” which means the characterization of the latter necessarily requires reference to the first. In contrast, the objective world is associated with exteriority and transcendental reality, the sphere of objects existing as they really are. An object is thus defined as something that exists “in-itself,” fundamentally independent of human consciousness. Hence, subjects and objects are conceived as “externally related,” which means worldly objects are transcendent, completely independent of the subject’s consciousness that is searching for them.

Alternatively, the phenomenal world, also known as the perceptual world or “lived world”², refers to our fundamental grip of the world at the level of perception. It is “ontologically and epistemologically prior to the worlds of subjectivity and objectivity which dualistic thought posits as primary reality” (Dillon, 1997, p.88). From this perspective, the subjective and objective worlds are “ideal variants” of the phenomenal world—they are theoretical descriptions becoming reifications, so to speak. The phenomenal world calls for a return to the level of perception, or of phenomenon. There is no bifurcation between interiority and exteriority, but a tightly-webbed relatedness between the subject and the objects in the world.

The phenomenal world is simultaneously immanent and transcendent: worldly objects are in a crisscrossing relationship with the intentional, embodied subjects. The

² Dillon (1988) advises that Merleau-Ponty’s lived-world (*le monde vécu*) should not be considered as terminologically equivalent to Husserl’s notion of the life-world (*die Lebenswelt*). The lived-world and the phenomenal world are used interchangeably throughout the current project.

object is thus “in-itself-for-us.” Every presence trials a past and portends a future: there is a thickness in every passing moment. The world is a “primordial presence,” not an objective space inhabited by determinate objects. From a phenomenological perspective, the world is indeterminate and ambiguous in perception, although the embodied subjects are always trying to refine their perceptual clarity. Furthermore, intentionality or consciousness is not located within or inside a mental entity. Rather, it is radically redefined in terms of a self-world relationship, as an “intentional arc” between the subject and the world.

The notion of a self-enclosed mind or consciousness is also the inevitable consequence of subject-object dualism, because of the associated distinctions between inner and outer regions, and between mental and real realities. The history of phenomenological philosophy has witnessed numerous endeavors in challenging the traditional concept of a transcendental consciousness. For Merleau-Ponty, there is one theme that truly highlights his refutation against the Cartesian consciousness: the tacit cogito vs. the Cartesian cogito. The Cartesian cogito is the transcendental consciousness or ego—an absolute identity that exists on its own term, independent of the world of objects, and is not bounded within the sphere of immanence. In contrast, the tacit cogito refers to the pre-reflective perceptual consciousness, the primordial awareness of oneself to oneself and to a world. As Dillon (1997) points out, the major distinction between the tacit cogito and the Cartesian cogito lies in “the difference between anonymity or generality of the former and the personal or individual nature of the latter” (p.108).

The Cartesian cogito is the genesis of thematic self-awareness, the soul or psyche; it is characterized by self-reflexivity, a sort of cognitive act that personalizes and

thematizes perceptual experience. Nonetheless, thematic awareness is founded upon the tacit cogito, which is the more fundamental perceptual ground—a person can see an object without constituting an identity of himself as the seer or labeling the object as the seen thing. The identities of the subject and the object are not given at the level of perceptual experience. Such “anonymous” perceptual experience is immediately given to us as a meaningful totality, which already presupposes a relationship between the subject and the object. Merleau-Ponty suggests that whereas the term consciousness might serve as the starting point for philosophical reflections³, it cannot serve as the “basic term in an ontology that succeeds in overcoming dualism” (Dillon, 1997, p.102).

According to Merleau-Ponty, the phenomenal world is fundamentally syncretic in nature. Nevertheless, a clarification needs to be made on the difference between syncreticism and undifferentiation. Most contemporary psychologists challenge the classical notion of a self-world undifferentiation, which suggests that newborns are incapable of distinguishing themselves from the environment. According to Merleau-Ponty (1968), this is also known as the hypothesis of “coincidence”—the self and the object completely “coincide” with each other, thus becoming indistinguishable from one another. In our view, syncreticism does not carry the same assumption as the hypothesis of coincidence. For instance, Werner (1948) suggests that syncreticism is a fitting description insofar as two differently-organized processes or structures are fused together in actual functioning. Thus, from the perspective of the phenomenal world, the subject and the objects do not become one physical thing, but are inseparable and tightly webbed together in perception.

³ According to Dillon (1997), Merleau-Ponty believed that “consciousness in phenomenology is a term seeking its own dissolution” (p.102).

Werner (1948) denotes that there are two well-documented perceptual mechanisms underlying the syncretic mode of perceptual functioning. First, this level of perception is based on an immediate experience of the physiognomies of an object. Physiognomy refers to the dynamic and expressive features of a face, a person, and very broadly, a form of life—which also applies to nonhuman forms and objects. It has been documented that very young children perceive inanimate objects in terms of the same emotional and expressive qualities they feel within themselves (p.167). Physiognomic perception is in contrast to the geometric-technical perception. The latter focuses on objective, measurable properties such as shape, length, width, brightness, hue, and so forth. This kind of perception describes how adult scientists and technicians construct the world, but there is no direct evidence that it serves as the foundation of infant's perception.

There is also no direct evidence that physiognomic perception dominates the infant's world. However, as mentioned before, there are observational and qualitative data such as children's drawings and verbal reports, suggesting that young children pick up the physiognomies of the objects in the world. Also, there are indirect empirical findings that suggest infants might actually perceive the inanimate as the animate, so to speak, which will be discussed in the chapter of infant's social world. Furthermore, the notion of physiognomic perception can incorporate the measurable objective properties of the world, which is not the case the other way around. For instance, whereas newborns might function primarily at the level physiognomic perception, they nonetheless are able to perceive when one object is taller, bigger, brighter, and making a louder sound than the other. More specifically, they can directly perceive the taller and bigger object in terms

of its physiognomic qualities, for example, as the more powerful, impending presence.

The second mechanism is known as synesthesia, or the syncretic unity of senses in perception, which is interrelated with physiognomic perception.⁴ For instance, a cheerful tone might strike us as light and colorful, and a dark inkblot might strike us as heavy and dull. Synesthesia involving vision, in particular, has drawn much interest from color theorists and perceptual scientists. Intersensory experience has also been documented in comparative studies, mostly in reference to what might be considered as nontechnological cultures and their languages (e.g., Werner, 1948, p.259). Infant researchers, too, take the concept of synesthesia very seriously as well. Nevertheless, they generally conceive it as the basis of intermodal functioning and cross-modal matching, without further consideration of its relevance to the infant's existence. From a phenomenological perspective, we believe that synesthesia provides a new understanding of the nature of a perceived object. Put simply, when an object is understood as the temporal-spatial unfolding of a phenomenon, the sensory experiences associated with this object are integral to its identity. This particular concept is central to the following sections in which we will investigate a series of research observations and experiments regarding the infant's understanding of the physical world.

2.2 How Do Infants Perceive Object Permanence?

Subject-object dualism leads to the view that the object is external, objective (real), and ontologically independent of the subject. This dualistic ontology brings about a major epistemological consequence: human knowledge of the world is based on the subject's endeavor to capture the "object-in-itself" and develop conceptual understanding

⁴ Synesthesia is often mistaken as an argument of complete indifferenciation of senses.

of the physical laws and principles that govern all objects. This is the rationale underlying the infant-as-scientist metaphor in contemporary infant psychology.

According to Merleau-Ponty (1962), the perception of the object-in-itself is an impossible one, because it assumes “a perception of the thing from all sides and throughout the history of its being” (Dillon, 1997, p.89). Subject-object bifurcation implies that in order to fully perceive objects-as-they-really-are, it would require an infinite perception that transforms the spatio-temporal unfolding of objects into atemporal entities. Such perception, accordingly, must necessarily encompass moments that are no longer and moments that have yet to be. From a phenomenological perspective, this idea of infinite perception is nothing but an ideal, presumptive synthesis.

In the phenomenal world, in contrast, we grasp and understand the objects as they unfold in perception. As a phenomenon unfolding in time and space, a perceived object is already in a meaningful contextual relationship with other proximal objects as well as the perceiving person. Thus, a perceptual phenomenon is already “circumscribed by such basic aspects of finitude as spatiality, temporality, sexuality, cultural sedimentation, and so on” (Dillon, 1997, p.89). This view brings the subject and the object into an integrated view of perception, in which both are “internally related” ontologically; the description of either one necessarily makes reference to the other. A phenomenological view of object perception rests on the radical notion of “primordial presence,” which draws together the perception of what is immediately present and the apperception of what is immediately absent (i.e. the past and the present, and the visible and invisible parts of an object). Accordingly, the presence of an object always “entails a possible absence” (Merleau-Ponty, 1962, p.90).

A phenomenological ontology challenges the traditional view on infant's object perception, which is based on the progression of cognitive development—the little scientist who gradually “gets” it. This portrayal is evident in the topic of object permanence in infant literature. According to Piaget (1928; 1952; 1955), infants do not possess the concept of object permanence until approximately nine months of age. In a series of experiments, he carefully observed the reactions of infants witnessing an interesting object or toy being hidden or disappearing. He discovered that the younger infants appeared confused or distressed, which indicates the belief that the object no longer exist in space. The infants of an older age showed a surprised reaction when the same thing happened, revealing a preliminary understanding of the permanent object which should not simply disappear into thin air. The infants of an even older age group demonstrated searching behaviors, showing their expectation that the object should continue to exist even when out of sight. Taken together, these observations led Piaget to conclude that object permanence is a cognitive achievement that has a developmental timeline.

From a cognitive perspective, young infants cannot reason objects that are perceptually absent. In other words, they lack “object concepts.” Unlike “object percept” or the immediate sensory experience of an object, “the concept of an object is the result of a mental operation that is inseparable from sensory experience. It is the product of thought: it is an idea or system of ideas” (Rochat, 2001, p.96). Apparently, an object concept is essentially a representational idea. It follows that *object permanence* as a concept literally refers to the cognitive ability to *represent* objects in their perceptual absence.

Merleau-Ponty (1962) identifies two opposing perspectives of object perception that are rooted in Cartesian subject-object dualism. Empiricism puts forth the primacy of the object; object perception is conceived in terms of a progression that begins from relatively partial and imperfect to complete and accurate perception of objects-as-they-really-are. Accordingly, object permanence is an inevitable cognitive achievement because the objective world is inhabited by determinate spatial objects; it is only a matter of time until this external reality impinges itself on the infants.

In contrast, intellectualism supports the primacy of the subject; the perceived object is reduced to the immanent structures of the subject's consciousness. Accordingly, mental and cognitive structures inevitably determine perception of reality, and thus, conceptual understanding precedes and constitutes perception. Put simply, object permanence is an inevitable outcome of the infant's cognitive development associated with neurological maturation. As infants begin to mature biologically and cognitively, they would naturally acquire the "concept" of object permanence.

These dualistic thoughts permeate the research literature on object permanence. If one thinks of the infant in terms of an internal mind against an external world of objects, it is inevitable to ask these following questions: How do infants come to understand object permanence? Is this understanding or knowledge based on a gradual development of conceptual schemas, which constitutes the world as inhabited by determinate and permanent objects? Or, is it founded on a gradual recognition of the fact that the objects are real entities in the external world that do not simply vanish? As demonstrated in the following section, a phenomenological analysis would show that these questions are the wrong starting point to approach the infant's behaviors observed in experimental

conditions. In this section, we will reinterpret an extensive developmental description of the infant's acquisition of object permanence provided by Maurer and Maurer (1988).

The following excerpts represent the general view of object permanence shared by most contemporary infant researchers and psychologists.⁵

A Phenomenological Re-reading of an Extensive Research Summary

An extensive summary of object permanence research (Maurer and Maurer, 1988) is divided into four excerpts for further examination. These excerpts describe the developmental progression of the infant's "cognitive achievement" of object permanence. Our primary goal here is to deconstruct the rationale of interpreting the following observations as indicating the existence of conceptual knowledge, and set up the foundation of a nondualistic framework for conceiving infant's understanding of worldly objects.

Excerpt 1

From birth to one month of age the baby shows no sign whatsoever that he understands the permanence of objects. Out of sight seems to be literally out of mind (Maurer & Maurer, 1988, p.91)

This excerpt makes reference to the general observation that newborns tend to immediately lose interest when an object disappears from the visual field. The characterization that "out of sight seems to be literally out of mind" reveals a typical logic of reasoning in the traditions of cognitive psychology. Nonetheless, a critical investigator is led to ask if what researchers observed in the newborns necessarily supports a distinction between perceptual and mental territories. From a dualistic

⁵ There have been many research experiments that claimed to explain the infant's acquisition of object permanence. Their focuses and experimental procedures often vary a great deal. Maurer & Maurer (1988) provide an excellent summary involving most of the important findings in this area of research.

perspective, the newborns only have an immediate visual grip of the object, with no concept of its permanence as a fact of the external world. As the object becomes visually inaccessible, they automatically disengage and stop looking. Accordingly, the newborn's object perception is portrayed as somewhat incomplete or inaccurate, because it is measured against the objective physical world that preoccupies physicists.

From a nondualistic perspective, however, there is nothing incomplete or inaccurate about the newborn's object perception (Merleau-Ponty, 1962). The perceived object is a complete spatio-temporal phenomenon, fully meaningful in its own terms. For the newborn, object perception is coextensive with the act of looking.⁶ When an object is out of sight, there is nothing for the eyes to fixate on. Through a phenomenological analysis of Piaget's observations on his infant daughter, Simms (2008) suggests that the attention flow of young infants moves in a different pattern than that of older children and adults. The newborn's visual attention is continuously redirected toward the next interesting thing or event based on her bodily desires and motor capacities. In other words, the newborn is almost completely caught up in the immediacy of sensory experiences. This is a description of what Merleau-Ponty called the *operative intentionality*: "the natural and prethematic unity of the world and of our life" (p.91). When an object of interest disappears, the newborn simply moves on. Nonetheless, as the newborn develops more advanced motor flexibility and visual-tracking ability, her "anchorage" in space and time will be expanded accordingly, and the nature of her grasp of the objects will be transformed as well.

⁶ It is important to consider infant's repertoire of visual tracking as well. In the first month of life, newborns have very limited visual tracking ability. The emergence of more advanced visual tracking ability as well as motor capacities literally transforms the infant's phenomenal world. This is a major theme in one of Merleau-Ponty's earliest work, *The Structure of Behavior* (1963).

Excerpt 2

Between one and four months the baby stares for a moment at the point where an object disappears from his sight, as though he is intrigued by its disappearance. This is the earliest evidence of his thinking about an object while it is out of sight. But he thinks about it only for a moment: the object disappears from his mind almost immediately (Maurer & Maurer, 1988, p.191).

This excerpt contains one simple behavioral observation: the infant's staring, and the rest is the authors' own interpretations. There is no objective method to examine whether or not the baby is "intrigued" or "thinking" about the object when it is out of sight. Hence, it is important to call these assumptions into question, and reexamine the validity of these arguments. Whereas the infant's staring is quite a revolutionary phenomenon from a developmental point of view, it is premature to consider it as an "evidence" of thinking or cognition, or the existence of a mind that thinks about an object. This is an example of what might be called an ontological leap.

There is only one certain conclusion here: the infant shows a reaction when an object that appeared moments ago disappears. Why? The infant might be surprised, intrigued, frustrated, or shocked—there is no way to find out with certainty. This could very well be a reaction of "violated expectancy."⁷ Nevertheless, does the notion of expectation necessarily suggest the existence of an isolated mind that gradually acquires more and more object concepts of the world? This is an ontological issue that will continue to be examined throughout this chapter.

Excerpt 3

Between four to eight months the baby appears to begin to understand. He will pull a toy from your pocket when it is only partly visible. He will look toward the floor after he drops a toy. If a toy train runs into a tunnel, he will watch the

⁷ The "violation of expectancy" is a popular rationale for explaining the behaviors that might indicate object concepts or principles.

tunnel's exit for the train to reappear. He enjoys playing peek-a-boo. But this understanding is very limited. If you draped a handkerchief over a toy that he is holding, thereby hiding it entirely from his eyes, he will not remove the handkerchief, even if the toy is making a noise. If the handkerchief falls off, he appears surprised to find himself holding the toy (Maurer & Maurer, 1988, p.191).

This excerpt presents a series of interesting observations that provide clues to the infant's understanding of partiality, motion, and temporality. Apparently, the infant is now living in a markedly different world. This transformation is not based on the acquisition of the "correct" view of the external world, however. With increased motor flexibility and enhanced visual tracking, the infant's conscious existence has been expanded in both spatial and temporal dimensions. Hence, some expectations about how the world should unfold are beginning to develop.

The infants can now perceive both the appearance and disappearance of a moving object as moments of a single perceptual episode (temporality), but only insofar as there are visual traces of its existence. For instance, they can track a single object (i.e. the train) as it moves across space, and anticipate its movement as it goes through a penetrable object (i.e. the tunnel). Also, they can now perceive presence and absence as two integrated aspects of how an object shows up in their world (partiality). In particular, the perception of a partially visible toy in a pocket can motivate them to engage in a motor project of retrieving it. Furthermore, they can also perceive that a moving object passing through another penetrable object, despite a brief disappearance from sight (motion in space). Nonetheless, a complete disappearance of an object from the visual field, such as being completely hidden behind an occluder without visual traces of its existence, is still an incomprehensible phenomenon for the infants at this age.

From a critical standpoint, it remains unclear as to how these observations would

support the notion of an isolated mind. From a phenomenological perspective, the behaviors described in the excerpt can be explained without resorting to a neutral, observing mental entity that constantly attempts to “get” the permanence of objects in the external world. According to the idea of an objective world, things do not “appear” and “disappear” because physical objects are by definition complete, determinate, and total. Hence, when we speak of the infant’s perception of appearance, partial appearance, and disappearance—all of which presuppose a point of view of the perceiver, a meaningful subject-object unified relationship has already been implied.

From a dualistic perspective, an object carries certain qualities or features that contribute to a variety of sensory experience. For example, a toy in the infant’s hand makes noise and gives a unique visual appearance; these are considered as the qualities of the toy, secondary to the existence of the object itself. From a phenomenological perspective, however, the sound and the visual appearance are integrated and inseparable aspects of the perceived object. Thus, what was previously perceived as an integrated whole is no longer the same object because a major perceptual element has been removed. Accordingly, when the toy is covered up by a handkerchief, the infant simply hears noises.

What about the case when the infant is actually holding the hidden toy in her hand? Whereas the infant still has a grip on the toy’s touchable aspect, it is no longer the same visible and sound-making object that was in her hand moments ago. For the same reason why an infant might not extend her reach to touch an object out of range, the tactile sensation or the noise alone is insufficient to motivate the infant to seek for the toy. According to Simms (2008), the infant’s bodily actions at this age are still closely tied to

the “landscape of things” (p.92). Thus, the infant cannot understand the pointing hand-gesture as a sign pointing to a world beyond immediate experience; instead, she would merely stare at the pointing hand as noted by Stern (1985). In the same vein, the infant cannot follow the auditory experience (the noise) or the tactile sensation (the toy’s in her hand) to rediscover the visual existence of the toy.

Excerpt 4

Between eight and twelve months the baby appears to understand the objects are permanent. If you hide a toy beneath a handkerchief, he will retrieve the toy. If you play a conjuring trick by replacing the hidden toy with another, or making it vanished, he acts surprised (Maurer & Maurer, 1988, p.192).

This last excerpt is supposed to describe the stage in which infants finally achieve object permanence as a concept. There are two concrete behavioral observations here: the infant’s retrieval of the hidden toy and her surprised reaction toward the “wrong” toy. These behaviors describe the infant’s responses to partially or completely occluded objects. In infant research, these behaviors are interpreted as the evidence of the infant’s conceptual acquisition of object permanence.⁸ Is there a different way to interpret these behaviors without resorting to the idea of conceptual knowledge?

Let us recall the notion of synesthesia and reflect on the unity of vision and touch. According to Merleau-Ponty (1962), vision and touch are not considered as “coincidental” or “superposable”: they never reach coincidence and become one thing. Rather, vision and touch are united in one body and thus open to a unitary world. Vision and tactility are united in such a way that they are “reversible”; what can be seen has a carnal reference to its tactility, and what can be touched has a carnal reference to its visual

⁸ This internal view of physical knowledge has not been effectively challenged in psychology; ,it always seems to be the only explanation for such behaviors

existence.

What does visual-tactile synesthesia have to do with the behaviors described in this excerpt? When infants come into visual contact with an object, they simultaneously perceive (or apperceive) its potential to be touched.⁹ Visual perception of an object implies (not cognitively) its existence as a potentially touchable thing. Although the seen object might not actually be touchable in reality, it nonetheless provides a sense of tactility and texture.¹⁰ This is demonstrated by newborns' pre-reaching behavior while tracking an object visually (Von Hofsten, 1982). Neonates show frequent forward arm movements, as if their bodies are plunged into reach-like actions, when their eyes are locked into a proximal object.

The opposite is also true: touching an object implies its potential to be located and captured by vision as well, thus, affirming its existence as a visible thing. However, if an object is placed in the infant's hand, the tactile sensation itself would not make her bring the object into the center of the visual field for better clarity and further exploration. Research shows that infants do not engage in this action until two months of age (Rochat, 1989). Hence, it seems that visual-tactile synesthesia also follows a developmental trajectory. Nonetheless, even though the mere sensation of touch might not propel the infant to bring an object into her visual field for further exploration, the object as a visible thing is already implicated in the perception of touch and its confirmation is inevitable at a later age.

Object permanence literally refers to the *awareness* that objects continue to exist

⁹This is sometimes captured by other terms such as “apperception” or “co-perception” (Rochat, 2001).

¹⁰ After all, we all know what it “feels” like to touch the clouds in the sky.

even when they are no longer visible. It seems that infants have finally developed this awareness toward the end of her first year. However, our explication of the visual-tactile synesthesia has demonstrated that this awareness is not based on a conceptual acquisition of object permanence as a fact of the external world. Because an object's visibility and touchability are reversible and mutually implicated, the infant in a way always "knows" or understands that objects are permanent—it is already implicit in her earliest experience with objects.

Simms (2008, p.93) suggests that the achievement of object permanence corresponds to the infant's emerging capacity for referential and symbolic actions. According to this idea, when the infant at this age witnesses an interesting toy being hidden under a handkerchief, she can now perceive the handkerchief as a sign that opens up a future-oriented action space, which has been extended beyond her immediate visual world. In addition, the infant's ability to remove the handkerchief and retrieve the hidden toy is also connected to her increasingly advanced motor ability—to reach with her hands, to extend her limb, to crawl on the floor, and so forth. The infant can now actualize the implicit touchability of the hidden toy, because she has developed a pre-reflective understanding of the handkerchief as an occluder, and of her bodily capacities to rearrange objects in her action-space (i.e., to remove the handkerchief).

Also, given that the sensory experiences associated with a perceived object is integral to its identity as discussed before, the infant acts surprised toward the wrong toy after the handkerchief has been removed. In other words, the infant *knows* the toy she is searching for. This understanding is based on the infant's bodily engagement in the world, rather than a mental encyclopedia on object permanence within her mind. By

logic, the object as a visual “occluder” presupposes both a vantage point (of the infant) as well as another object that is partially or completely blocked. In other words, the notion of a visual occlude implies the presence of an object of interest, and thus, the intentionality of the infant. Thus, the perception of a visual occluder actually reveals the infant’s embodied situation in which one object is blocking her direct visual access to an interesting object. Hence, an object’s presence, absence, or partiality always presuppose the inseparability of the subject’s intentionality/situation (i.e. his interest and vantage point) and the object’s spatial existence. Visual occlusion as a phenomenon has no place in either the subjective mind or the objective world, because it can only be defined in terms of the infant’s relation-to-the-world. This is a great example of why objects are best understood as “in-itself-for-us.”

In conclusion, from a phenomenological perspective, the perceived object is viewed as a phenomenon unfolding in space and time, and the associated visual and tactile experiences are integral to the identify of this object. Visual perception of an object provides the infants with a tactile grip of it, and the reverse is also true to some extent. Furthermore, the mere visual perception of an object does not reduce its existence as being entirely visual without reference to its touchability, which seems to be an implicit assumption for some researchers.¹¹ A seen object understood synesthetically has a built-in experiential reference to its tactility—in that, the object has also registered a place in the tactile dimension of infant’s lived-world. Thus, the infants “know” in an implicit, embodied manner that visible objects exist in space as touchable objects. This understanding is the foundation of the infant’s behaviors (e.g. retrieval of hidden toy;

¹¹ Otherwise, why would researchers be intrigued by the fact that infants eventually look for something no longer visible?

looking surprised at wrong toy) that have been taken as the evidence of object permanence as a cognitive achievement.

2.3 How Do Infants Perceive Objects-in-motion?

Objects-in-motion are another intriguing phenomenon that captures the attention of many infant researchers. The general empirical observation is that infants seem to “expect” an object moving on a connected path unless it comes into contact with another object. When two objects are about cross paths with each other, infants seem to anticipate a collision. In infant psychology, these observations have been taken as an indication of the infant’s conceptual knowledge about the physical principles of the world.

First, the principle of solidity refers to the understanding that an object occupies space in exclusivity, and thus two objects cannot coexist in the same space simultaneously. Second, the principle of spatio-temporal continuity means that the same object exists continuously in space and move on connected paths. Third, spatial objects always move independently if they do not come into contact with one another, which is also known as the principle of no-action-at-a-distance.

Many research studies have been done in order to further investigate the infant’s understanding of these physical principles. The “violation-of-expectancy paradigm” is a major experimental method in these studies. In these experiments, researchers often presented the infant subjects with physically impossible/improbable events and looked for their behavioral signs for violated expectations. Such behavioral evidence is generally measured by the duration of visual attention: if the infants have knowledge of certain physical principles that govern the objects-in-motion, they should expectedly look longer at the improbable outcomes. Accordingly, the longer visual attention to the improbable

event is viewed as the indisputable proof of conceptual object knowledge inside of the young infant's mind. In this section, we will closely examine a couple of major studies that have been frequently cited as the supporting evidence of infant's physical knowledge about these principles.

A Phenomenological Approach to the Original “Drawbridge” Study
(Baillargeon et.al., 1985)

The “drawbridge” experiment is one of the most frequently-cited infant research studies, because it has been widely taken as the empirical evidence of object concepts in early infancy. The experiment was designed to study the infant's ability to distinguish between probable and improbable physical events. During the familiarization trials, a group of five-month-old infants were exposed to a screen (the “drawbridge”) rotating 180-degree backward on a table. During the experimental trials, a solid object (a box) was placed behind the drawbridge, which would prevent it from making a complete rotation. In one experimental condition, the infants witnessed the rotating drawbridge being stopped by the obstructing box, which was the probable outcome. In the other condition, they saw the drawbridge rotating “through” the box, which was the improbable outcome. The researchers hypothesized that if the infants can notice the difference between two events, they should look significantly longer at the improbable outcome because their expectations are “violated.” As a matter of fact, this is precisely what the researchers discovered in this study.

The Conceptual Hypothesis vs. The Perceptual Hypothesis

According to this “conceptual” hypothesis, the infants looked longer at the improbable outcome because it “violated” the physical principles of the world. Thus, it follows that the infants must possess some forms of conceptual knowledge about spatial

objects. Before we directly address the ontological issues associated with this conceptual explanation, it is important to discuss an alternative “perceptual processing account” provided by other infant scholars (Haith & Benson, 1997). According to the perceptual-processing explanation, infants are born with some perceptual preferences and inclinations, as their gaze is always directed at the salient and appealing features of the world. In particular, Rivera et al. (1999) found that infants have a natural preference for 180° rotations as a visual stimulus. In the original drawbridge study, the screen actually rotated farther in the impossible event than in the possible event. Thus, the infants were not paying more attention at the “impossible event” *per se*, but the complete rotations they naturally preferred.

Scholl and Leslie (1999) suggest that this ongoing debate between the two rival explanations demonstrates a clear dichotomy between perceptual and cognitive processes in the infant literature. The disjunction between perception and cognition is a direct consequence of Cartesian dualistic ontology. Perception is bounded within immanence and associated with mechanical bodily processes, whereas cognition is related to higher-order mental operations that render perception meaningful. At the level of theory, the conceptual account and the perceptual-processing explanation are both tenable explanations. Scholars from both sides witness the same behavior, and their explanations share the same ontological foundation. From the original study alone, it is difficult to judge which line of reasoning is better.

In our view, the real problem lies in the dualistic framework that constitutes perceptual and cognitive processes as mutually-exclusive in explaining the drawbridge phenomenon. The perceptual-conceptual dichotomy underlying both theoretical

explanations renders a unified view of perception impossible. The conceptual account suggests the primacy of an impossible physical event, and the perceptual account implies the primacy of an internal cognitive operation. Is it possible that infants might possess some perceptual preferences and inclinations, as well as some understanding about how physical objects behave in space? If both mechanisms are active, it is important then to examine how they interact in actual functioning. In fact, taking into account both mechanisms might provide a more thorough interpretation of the variability of all the follow-up drawbridge studies, as will be discussed later.

A nonconceptual revision of physical understanding

At this point, we have found that it is difficult to decide whether the perceptual or the cognitive mechanisms played the exclusive role in the original study, and the debate is rooted in the perception-cognition dichotomy in Cartesian dualism. Perhaps it is time to take a deeper look at the ontological issues underlying both accounts. In Cartesian dualism, the subject is viewed as an atemporal self, isolated as a point in space from the objects in the world. The presence is bounded within immanence, or our immediate perception of things—one cannot know or perceive anything beyond immediate sensory experience. An object is conceived as fully determinate, and its identity and attributes do not change in every passing moment. Thus, if the past must influence the subject's perception in the present, it must be stored inside the subject and served as a conceptual template for immediate perception. This is the ontological foundation of representational thoughts.

Under this dualistic ontology, there is no knowledge or understanding at the level of perception; if infants demonstrate behaviors that imply knowledge and learning, there

must be some form of cognitive mediation that took place. The perceptual hypothesis of the drawbridge study is very straightforward: it suggests that the infants simply preferred looking at an object making a full rotation. There is no question that infants are born with perceptual preferences. However, there is a question about whether or not perception is limited to mechanical bodily processes. In other words, the perceptual-processing explanation leaves no room for the possibility that the infants might have possessed some understanding of the physical world.

The conceptual account, in contrast, provides an extensive explanation of the habituation process and the visual occlusion involved in the study. In order for the infants to discriminate the difference between the probable outcome and the improbable outcome, they must have possessed the proper object-concepts that interpret perceptual data. This is precisely the logic underlying the portrayal of the little scientist, according to which the infants actively “reason” about objects, “make predictions” about their interaction in space, and “anticipate” certain possible physical outcomes (Rochat, 2002, p.101). However, if every instance of differential visual attention is taken as an evidence of conceptual understanding, and every sign of preferential looking is considered an indication of the conceptual distinction between two events, the young infant’s mind would be inhabited by an astronomical number of cognitive schemas or representations. Following this line of reasoning, every so-called just-noticeable-difference (JND) would be taken as a conceptual category in its own terms.

In order to transcend the dualism underlying both explanations, the key is to offer an alternate view of perception that does not exclude physical understanding, and that of physical knowledge that is not fundamentally conceptual. To begin, we need to employ

two phenomenological ideas: spatial affordances and embodied understanding. Spatial affordance is a unified view of perception in which the subject and objects are inseparable. From a phenomenological perspective, infants do not need to know the physical principles in the form of concept, because they are directly perceived and experienced as the background of possibilities. Gibson (1977) proposes a theory of affordance that highlights the intricate relationship between the subject's intentionality (& motility) and the "action-possibilities" of objects. An object is not perceived as something in-itself, and the subject does not hold absolute power to constitute an object. The notion of affordance testifies to the subject-object unity in perception—the context in which meaningful perception occurs.

Affordances can be perceived as both positive and negative, because perception both affords and denies certain action-possibilities. For instance, for a young child, a closed door affords possible actions such as knocking and turning the doorknob, partly because it does not afford being pushed open with brute physical force. In other words, spatial perception accentuates the probable and successful bodily projects (positive), and suppresses the improbably and unlikely bodily projects (negative).

Thus, spatial perception is inseparable with human embodiment: the structure of space is intertwined with the structure of our body. When there are multiple objects in the proximal field, the perception of affordances is understood in a more global sense. For example, when a young toddler sees an object with a wide flat surface (e.g. a small table) and a figurine, there is immediately for her an internal relationship between these two separate objects. Putting the figurine on a small table is directly perceived as an "action-possibility" for the young toddler, rather than an external connection between two

objects in the objective space, independent of her intentions and motor capacities. The table and the small figurine together form an action-possibility. The phenomenological view of spatial perception seeks to transcend the subject-object bifurcation, and radically challenge traditional concept of cognitive mediation. Accordingly, there is no need to presuppose conceptual knowledge in meaningful, spatial perception. Our embodied understanding of space is through a direct perception of affordances—making certain action-possibilities more likely and certain others less likely.

According to the conceptual hypothesis, the drawbridge study describes a phenomenon regarding the interaction between two objects in space (the screen and the blocker). How do infants understand objects are solid, occupy space in exclusivity, exist continuously in space, move on connected paths, and do not interact at a distance? The experimental findings seem to show that the infants could identify the probable event that was consistent with these physical principles, which explains why they looked surprised when witnessing the “improbable” event.

Nevertheless, according to the notion of spatial affordances, the infants did not need to project the conceptual principles into their immediate perception because the objects in space were never given to them as unrelated to each other. Instead, the infants directly perceived (and looked longer at) the less probable outcome as the more *attention-worthy* event, which does not require any secondary, higher-order cognitive operations.

These conceptual physical principles are the abstract descriptions of a first-order primordial world. It is an existential fact that infants are always in contact with visible and touchable things in the world. Touchable things occupy space and are not readily penetrated by other solid touchable objects. Infants know this through direct experience,

and do not need discover the principle of solidity as a concept. To sum up, conceptual understanding is not the prerequisite for infants to experience meaningful perceptions; rather, the physical principles are simply scientific abstractions/descriptions of the infant's embodied understanding in a primordial lived-world.

A Re-reading of Other Drawbridge Studies

Conceived in terms of an intertwined subject-object relationship, the phenomenological notion of perception is fully embodied, temporal, and contextual. Given that infants have both an embodied understanding of the physical world, as well as a natural preference for certain movements, it is no longer necessary to choose between the perceptual and conceptual accounts—the “either-or” framework might not be the best approach in this case.

The original drawbridge study (Baillargeon et al, 1985) has been subjected to many critical speculations. First, some researchers failed to replicate some of its findings (e.g., Bogartz et al., 2000). Second, minor variations in experimental designs and procedures played a major role in the disparity of findings across other follow-up and replication studies (e.g. Bogartz et al., 1997; Schilling, 2000). Third, Turke-Browne et al. (2008) identified the “enhancement vs. attenuation/habituation” controversy regarding the familiarization procedure—whether it enhances or attenuates preference for familiar stimulus. In order to explain the variable outcomes in these “drawbridge” studies, it is important to pay attention to the experimental procedures, and more globally, the experiential progression of the infants in these settings. Thus, our investigation is guided by three major experiential factors involved in these experiments: the habituation/familiarization process, perception of movements, and spatial reference/cues.

The Habituation Process: Some Considerations

Infant researchers often view habituation as the process by which the infants gradually decrease visual attention to repeated presentations of a stimulus. Given that the infants suddenly regain visual attention in response to a slightly different stimulus, it is taken as a sign that they “notice” something different. The rest of the story is a matter of interpretation—in short, whether they notice something “novel” or “unexpected.”

From a phenomenological perspective, it is important to reflect on the experience of the infants during the habituation/familiarization trials. The concept of habituation has always been haunted by some theoretical controversies in experimental psychology. For instance, it is incredibly difficult to decide whether longer visual attention found in these studies suggests the infants’ preference for novel stimulus or avoidance of repeated stimulus. Turk-Browne et al. (2008) proposes a few important questions for consideration. What level of habituation is just enough? What is too little habituation? What is too much habituation? From an experimental standpoint, the ideal level of habituation can be described as follows: just-enough exposure to a stimulus such that a similar stimulus generates neither interest nor aversion. There is nonetheless no proven way to achieve this ideal level of habituation. Hence, it is crucial to examine the habituation process in the whole context of a particular experiment itself.

What is “too much” habituation? It is difficult to draw the line that separates the habituation and extinction processes, so to speak. Furthermore, according to classical behaviorism, the extinction process can lead to stimulus-generalization, leading to a global unresponsiveness toward similar stimuli. In addition, it is even more challenging to figure out the basis of such aversive generalization (e.g. what constitutes “similarity”).

What is too little habituation? “Too little” habituation is not a negative term when understood as a learning process. Research shows that a brief exposure to the same stimulus would in fact enhance the infants’ preference for the familiarity, and to some extent, refine their reaction to similar stimuli. Nevertheless, it is equally challenging to identify the exact point where the repeated exposure to a stimulus ceases to be a process of perceptual enhancement or refinement.

Another important question concerns the nature of the stimulus involved in both the familiarization and the experimental trials. In other words, what exactly was being habituated—the rotating screen (i.e. 180° movement), the physical events (both probable and improbable), or both simultaneously? In the original drawbridge study, researchers used the rotating screen during initial familiarization trials, and provided the infants with a brief visual exposure to the box before the screen began to rotate in the experimental trials (Baillargeon et al., 1985). This exposure is extremely important because it provided the infant subjects with a spatial cue/reference that would change the spatial affordances in the field. The infant subjects first saw a screen making 180° rotations to which they were habituated. In one following experimental condition, they immediately witnessed an impossible event in which the screen seemingly rotated through the box and completed a 180° rotation.

According to the perceptual-processing hypothesis, it was believed that the infant subjects had just witnessed two events of 180° rotations. From a phenomenological point of view, this belief is a huge mistake because the introduction of a box significantly changed the spatial affordance in the field. Hence, the infants were no longer witnessing pure rotations in the experimental trials. In other words, the addition of the box was very

significant; what the infants saw was a physical event involving two objects, the screen and the box. Is it important to make such a distinction between the pure rotation movements and the physical event involving two objects, as two different kinds of stimuli? The answer should reveal itself in the following analysis of the “order effect” in the original study, as well as the variable outcomes found in other replication/follow-up studies.

The “Order Effect”

Table 1.1 The “Order Effect” (Baillargeon et al., 1985)

Experiment 1	<u>Familiarization Trials</u>	<u>Box</u>	<u>Experimental Trial 1</u>	<u>Experimental Trial 2</u>
<u>Physical Event</u>	possible		possible	Impossible
<u>Movement</u>	180°		120°	180°
<u>Spatial Affordance</u>	single object	Yes	two objects	two objects
Experiment 2				
<u>Physical Event</u>	possible		impossible	Possible
<u>Movement</u>	180°		180°	120°
<u>Spatial Affordance</u>	single object	Yes	two objects	two objects

*Note: The experiential aspects that called for the most attention are highlighted in bold .

There was an interesting “order effect” in the original study (Baillargeon et al., 1985). The infant subjects were habituated/familiarized with a screen moving back and forth in full 180° rotations, followed by two experimental trials preceded by a brief visual exposure to a box. In one experimental condition, they proceeded to witness the possible event (rotating screen blocked) followed by the impossible event. In the other experimental condition, the order was reversed as the infants saw the impossible event first and then the possible event. Interestingly, it was found that infants looked longer at the impossible event only when it was presented immediately after the familiarization trials. The researchers failed to find the same result if the infants witnessed the possible

event prior to the impossible event. In order to explore this so-called order effect, each of the experimental conditions must be viewed as a complete spatio-temporal phenomenon. Through a phenomenological reflection of the drawbridge experiment, we have come up with a series of tentative experiential hypotheses that might contribute to a thorough explanation of the infants' differential responses in the study.

- There is a natural preference for 180° rotations
- In the familiarization trials, the habituation stimulus is the movement
- The habituation to one movement immediately enhances the preference for a different movement
- The introduction of the box changes the spatial affordance in the field, and the change itself demands attention
- If the new spatial affordance is immediately violated by a physical event (incongruence), the reaction is much stronger
- If the new spatial affordance is immediately confirmed by a physical event (congruence) but violated by another event later, the reaction is not as strong.
- Incongruence between spatial affordance and the physical event preoccupies attention
- Habituation to a probable physical event is doubtful
- Habituation to an impossible physical event is even more unlikely, because there is no evidence that repeated exposure to something physically impossible would enhance sensitivity toward something physically possible.

In this first case, the infants were habituated to the 180° rotations, immediately followed by the 120° rotations in the first experimental trial. In addition, the novel 120° rotations

took place in a novel field of spatial affordance with the new addition of the box. Hence, even though the infants generally preferred 180° rotations, this experimental trial was still interesting enough to receive their attention. The second experimental trial presented an impossible physical event, which was incongruent with the spatial affordance. However, whereas this was also an interesting and somewhat shocking event for the infants, the fact that the field of spatial affordance has been confirmed before significantly lessened its impact. As a result, the infant subjects found both experimental trials equally interesting to some extent, and no difference was found in their visual attention toward them.

In the second case, the infants were habituated to the 180° rotations as well. In the first experimental trial, they immediately witnessed the impossible physical event, which was incongruent with the novel spatial affordance caused by the newly-added box. This event not only drew a great deal of attention from the infants, but it also directed their focus to the violated expectations. Thus, even though it was another trial with 180° rotations, the movement was faded into the background and there was no habituation taking place here. As a result, there was nothing particularly appealing about the 120° rotations (i.e. dishabituation effect) in the next experimental trial. Furthermore, because it is highly unlikely that one can be habituated by an improbable physical event, there was also nothing particularly appealing about the probable physical event in the last trial. Putting these considerations together, the first experimental trial was more interesting than the last one for the infants—thus, they paid significantly more attention to it, and an “effect” was found. As demonstrated here, if we can go beyond the perceptual-conceptual debate and reexamine the experiment from a phenomenological perspective, the “order effect” is not longer a myth and becomes an understandable phenomenon.

Reexamining Some Follow-up Experiments

Our investigation so far has led to some hypotheses or factors that might have contributed to the experimental outcomes. Do these factors apply to other drawbridge studies as well? Let us take a look at some of these studies.

Table 1.2 The drawbridge study without habituation (Rivera et al., 1999)

Experiment 1	<u>Familiarization Trials</u>	<u>Box</u>	<u>Experimental Trial 1</u>	<u>Experimental Trial 2</u>
<u>Physical Event</u>	None		impossible	possible
<u>Movement</u>			180°	120°
<u>Spatial Affordance</u>		Yes	Two objects	Two objects
Experiment 2				
<u>Physical Event</u>	None			
<u>Movement</u>			180°	120°
<u>Spatial Affordance</u>		No	Single object	Single object

Rivera et al. (1999) carried out two experiments without habituation, which was believed to be unnecessary. In one experiment, they simply compared the difference in the infants' visual attention between the possible and impossible events. As expected, the infants looked longer at the impossible event. In a different experiment, the infants were simply exposed to two physically-possible events, but they looked longer at the screen rotating in 180° rather than the screen making 120° rotations. The fact that the infants looked longer at the 180° rotations in both experiments was taken as a support for the perceptual-processing explanation.

However, this line of reasoning overlooked the significance of the box. According to our earlier hypotheses, the new box transformed the spatial affordance in the field. Hence, the infants in the first experiment looked longer at the physical event that violated their affordance perception. In the second experiment, however, there was no introduction of the box into the field. As a result, the infants looked at the movement

that they naturally preferred, which was the 180° movement. Without the potential complication caused by the familiarization/habituation process, it seems that these studies suggest that infants possess a natural perceptual preference for some movements, as well as the ability to directly respond to the more improbable physical event based on affordance perception.

Table 1.3 The control experiment by Baillargeon et al. (1985)

	<u>Familiarization Trials</u>	<u>Box</u>	<u>Experimental Trial</u>	<u>Experimental Trial</u>
<u>Physical Event</u>	Possible		Possible	Possible
<u>Movement</u>	180°		180°	120°
<u>Spatial Affordance</u>	Single object	“out of the way”	Two objects	Two objects

Baillargeon et al. (1985) carried out an additional control experiment in which the infants were also habituated to a screen moving in full 180° rotations. However, there was a little twist prior to the experimental trials: the box was introduced into the field, but it was “out of the way” such that the screen could still freely move in complete rotation. Hence, both events in the experimental trials were equally possible. If the infants did not perceive a change in spatial affordance, how come there was no difference found between the two events? Why didn’t the infants look longer at the 180° rotations? The answer lies in the familiarization trials. Because the infants were habituated to 180° rotations, their natural preference for it was partially cancelled out when they were exposed to the same movement again in the next experimental trial. This control study shows that the habituation process can potentially undermine a natural preference, and that infants can perceive spatial affordances in a very precisely and refined manner.

There are a couple other drawbridge studies that might shed light on whether or

not the level of habituation matters. For instance, what is too little or too much habituation, and how might it be relevant to the outcomes? Bogartz et al. (2000) designed an experiment that provides some clues about the impact of insufficient habituation. In general, seven is the mean number of habituation trials established by researchers (Baillargeon et al., 1985). However, the infants in this study were habituated to 180° display for only three trials, and as expected, they looked longer at the impossible event. Coming from the perceptual-processing camp, the researchers suggested that insufficient habituation actually enhanced the infants' perceptual preference for familiarity.

Ironically, as demonstrated in one previous study (Rivera et al., 1999), infants are generally more sensitive to the impossible physical event given no habituation trials took place. A few habituation trials to 180° rotation might enhance familiarity-seeking in general, but the experimental trials did not simply contain movement. As discussed before, the introduction of a box during experimental trials would significantly transform spatial affordances—at the moment, the field does not “afford” the screen making full rotations anymore. Thus, there is no difference between a few habituation trials and no habituation at all; in either case, the infants paid significant attention toward the impossible physical event.

What about too much habituation? Schilling et al. (2000) carried out a study in which the infants went through twelve habituation trials looking at the 180° display. It was found that they looked longer at the 112° display (a possible event) than the 180° display (an impossible event). Researchers argued that the infants were simply responding to perceptual novelty, as suggested by the perceptual-processing explanation.

However, there might be an alternate explanation. When habituation goes overboard, so to speak, considerations need to be made concerning the extinction process and stimulus-generalization.

Too much habituation can lead to three consequences: no reactivity toward the same/similar stimulus, avoidance of the same/similar stimulus and seeking out for novel stimulus, and aversive stimulus-generalization. Taken together, the infants in this study might have developed an aversion to 180° rotation, actively avoiding any display that resembles this type of movement. In addition, over-habituation could not only cancel out their natural preference for 180° rotation, but it could also take away their attention toward the probable-improbable dimension of these physical events. During post-habituation, the infants might have been more preoccupied with avoiding anything similar, as opposed to paying attention to how the box might have changed the spatial affordances in the field. Thus, it can be said that over-habituation can dampen the infants' natural perceptual preference, as well as their attunement to spatial affordances.

Partially-Occluded Object Movement

The conceptual account of infant's physical understanding also attempts to draw support from the research studies involving occluded object movements. Rochat (2002) suggests that the notion of object-concepts is not simply limited to "a static representation of the perceptually absent object," but it also includes "movements and spatial transformation when out of sight" (p.103).

Rochat and Hespos (1996, 1997) designed an interesting experiment in order to further examine the nature of infant's object-concept. The researchers placed several groups of infants (four and six month olds) in front of a puppet stage. In the "translation

condition,” the infants witnessed a Y-shaped object falling vertically from the top of the stage and landing right behind an occluder. When the experimenter removed the occluder, the infants saw either a probable (Vertical Y) or an improbable outcome (Inverted Y). In the “rotation condition,” the same object fell in a 180° clockwise rotation and disappeared behind the occluder at four o’clock. The infants then witnessed either a probable (Inverted Y) or improbable outcome (Vertical Y).

The results demonstrate that four-month-old or older infants tend to look significantly longer at the improbable outcome in both experimental conditions. The infants appeared to “know” what happened behind the occluder, anticipating the manner in which of the Y-shape object was rotating.

In infant research, perceptual representations are considered to operate only on visible objects, whereas conceptual representations can persist and transcend the immediacy of the visual experience. Thus, it is believed that only conceptual representations can survive occlusions. If research can demonstrate the infant’s ability to represent object’s movement and spatial transformation when out of sight, the conceptual account would appear to be validated. This is precisely the rationale of the researchers’ interpretation in this study: “Infants saw the object disappeared behind the occluder and managed to predict, using conceptual representation alone, the final orientation of the object” (Rochat, 2001, p.106).

The researchers carried out an additional experiment to control for confounding perceptual factors. In this control study, an object simply rest at the top of the stage with no movement involved, and the infants looked equally at this object in either orientation at the bottom of the stage when the occluder was removed during experimental trials.

The “Translation” and “Rotation” Conditions

In the *translation condition*, the infants first went through six familiarization trials in which the Y-shaped object fell vertically until it landed behind an occluder. They proceeded to witness the same movement in both experimental trials, except that the occluder was lowered to reveal the final orientation(s) of the object. In the probable outcome trials, the Y-shaped object was revealed in the vertical orientation. In the improbable outcome trials, it reappeared in the 180° inverted orientation.

As mentioned before, the infants in this condition looked longer at the 180° inverted orientation. Like all the drawbridge studies discussed previously, this particular finding is subjected to the perceptual-conceptual debate. It can be explained by violated-expectancy or perceptual novelty, both equally valid according to their own theoretical rationales. Nonetheless, it was the following experimental condition that presents a significant challenge to the thesis of perceptual novelty.

In the *rotation condition*, the infants were familiarized with six trials of a Y-shaped object rotating in 180° as it disappeared behind an occluder at four o'clock. Then, they witnessed the same movement in both experimental trials, and the occluder was lowered to show the final orientation(s) of the object. In the probable outcome trials, the Y-shaped object was in the 180° inverted orientation. In the improbable outcome trials, it reappeared in the vertical position.

The infants in this condition looked longer at the vertical orientation, which was identical as the Y-shaped object's starting orientation. In addition, Rochat (2001) discussed a control group in which infants witnessed the object resting motionless at the top of the stage, and looked equally at either orientation at the bottom of the stage.

Together, these findings seem to eliminate the possibility that the infants were simply comparing two static appearances.

The infants did not perceive and compare two isolated appearances of the same object. Instead, they perceived “the motion and the trajectory” of the object (p.106). In fact, there were no isolated appearances of the object in either experimental condition. Thus, the thesis of perceptual novelty should neither be validated nor invalidated based on this study. Not only did the researchers discredit the assumption that infants might look longer because the ending orientation was different from the starting orientation, but also hinted that the precondition to validate it was absent.

In order to make sense of the infants’ differential looking time of two ending orientations, it is important to reexamine the outcomes in terms of movement perception. Why did one trial demand more visual attention from the infants than the other trial? The researchers resorted to the conceptual explanation, because it seems that the violated-expectancy hypothesis might be the only tenable explanation for this part of the experiment. The issue that remains debatable, however, is whether or not expectancy necessarily requires the mediation of a representational mind.

The Mental Tracking Explanation

According to the researchers, this study testifies to the infant’s ability to generate “dynamic mental imagery” that “prolongs the information given by perception” and “allows infants to predict both visible and invisible transformations” (Rochat, 2001, p.105). From this perspective, the infant possesses some understanding of physical principles that would render conceptual representations possible. Accordingly, conceptual representation is the only explanation for why the infants’ perception of the

rotating Y-shape object did not stop as soon as it disappeared behind the occluder. Finally, it was only conceptual representations within the mind (independent of the actual moving object) that could support the infants' *mental tracking* that survived temporary occlusion in the experiment. This account, apparently, is thoroughly dualistic, and its argument is contingent on whether or not infant's visual-spatial expectancy necessarily suggests the existence of conceptual representations. Is there a nondualistic concept of expectations that can survive occlusion as well?

The "mental tracking" explanation rests on the assumption that eye movements are simply reacting to the object moving in successive points in space. Because the eyes are "following" the moving object, their access to it is completely "cut off" as soon as it moves behind an occluder. If that is the case, the eyes will always trail behind the moving object, rendering something like catching a fast moving object in mid-air impossible. Stern (1977) carried out a microanalysis of a classic boxing match, and discovered that a substantial percentage of boxers' jabs were faster than visual reaction time (~180 millisecond). Beebe & Lachman (2002) further elaborates that human bodily actions, such as a punch or a block, indicate a "hypothesis-generating" component in the perception of movement.

With familiarizations, the eyes track an object not by following the moving object at each successive point in space it occupies in transit, but actually by outrunning some instants of its movement. Nonetheless, it would be equally untenable to suggest that the moving object is trailing behind the act of looking, because our vision cannot constitute object movements that do not exist; such a relationship renders our body neglectful of the

changes in space. Instead, a genuinely unified subject-object view of perception would suggest that the act of looking is simultaneously with object movement.

If effortful movements such as a punch can surpass the speed of visual perception, eye movements are certainly capable of the same feat. Thus, the representational explanation would yield a dwarfed portrayal of human intelligence. We must then conceive the body as thoroughly intelligent as a unified system, responding directly to the constant changes in the world; the presence is past-loaded and future-implicated, always in the process of becoming.

With regard to the phenomenon of an object-in-motion, Merleau-Ponty (1962) argues that “if we want to take the phenomenon of movement seriously, we shall need to conceive a world which is not made up only of things, but which has in it pure transitions” (p.320). The idea of “pure transitions” refers to the fact that the phenomenal world is not made up of determinate and static objects, but movements of the objects (animate or inanimate) are an integral part of our everyday experience. From a phenomenological perspective, object movements are not secondary to the objects themselves. In fact, Merleau-Ponty would suggest that the human body is not designed to respond to a world of static objects.

In conclusion, it appears that expectations and anticipations were involved in this experiment. However, if we conceive the infant’s body as inherently coupled with the world, which is neither determinate nor made up of static objects, the perception of object movement becomes an anticipatory act in which expectations of its trajectory and visual transformations are already implicated. There is a kind of perceptual momentum that builds on itself as the movement progresses. The occluder in the current study was

placed to block only the ending orientation of the Y-shaped object's movement. One can easily imagine a different outcome if the occlusion took place at a much earlier time before the object showed cues of rotation and falling. Hence, the general claim that only representations can survive visual occlusion is inaccurate. From a phenomenological point of view, it is crucial to consider the relationship between what was visually accessible and what was occluded.

In this sense, Merleau-Ponty's characterization of movement perception is strikingly insightful: "the something in transit which we have recognized as necessary to the constitution of a change is to be defined only in terms of the particular manner of its 'passing'"(1962, p.320), or, in other words, by means of its "behavior". Regarding the current experiment, the infants had plenty of visual access to the trajectory and rotating "behavior" or "manner" of the passing object. The ending orientation, though visually inaccessible, was built into the infants' perception of the object's rotating movement.

Thus, it can be argued that movement perception is fundamentally anticipatory or "hypothesis-generating," requiring no internal mental representation to survive occlusion. The infants in this study might have noticed a physical outcome that violated their expectation. Nonetheless, this recognition does not require the infants to possess some conceptual understanding of the physical world, nor to reactivate an internal schema of the object movement (which they learned during the familiarization trials). From a phenomenological perspective, perceiving movements of an object is to decipher its behaviors or its manner of passing, which can survive some forms of temporary occlusion.

2.4 How Do Infants Perceive Object-Categorizations?¹²

In this section, we will reexamine a central ontological issue based on a major research study, and reflect on the infants' experience during the habituation process in order to provide an alternative explanation for the outcomes. Using the habituation/dishabituation paradigm (Eimas & Quinn, 1994), the researchers examined a group of three-month-old infants' ability to discriminate animal categories such as horses and cats. The infants were visually habituated to repeated presentations of different exemplars of either horses or cats. During the test trials, they witnessed the presentation of either a new horse or a new cat (novel exemplar/same category), or a zebra or giraffe (novel exemplar/different category). It was found that these three-month-olds regained visual attention when presented with novel exemplars from a different category.

The topic of object categorization is another example of cognitive representationalism in the infant literature. Many researchers believe that infants actively group external objects into mental categories, which are then stored in memory and organize future perceptions.

Mental Categorical Schemas vs. A Categorical World

Do infants divide the world up into distinct categories based on similar physical properties, such as shape, color, and sound? Are there some real, objective physical attributes that render some objects more likely to fall under a category? Is object categorization based on a mental entity making copies of the world as it really is? More importantly, does the ability to categorize, under certain situations (e.g., in an

¹² This is another topic area posed in infant psychology regarding the nature of the infant's knowledge of objects.

experiment), equate to a categorical world in direct experience?

Alternatively, do infants actively constitute a categorical world through their cognitive abilities, such as the development of object concepts or conceptual prototypes? Is object categorization based on a constituting mind that continually develops more refined conceptual schemas through the process of assimilation and accommodation as Piaget suggested, which would break the world down into discrete categories? More importantly, does the ability to form conceptual categories, under certain situations, reflect a categorical world in immediate experience?

Evidently, these questions bring back the problem of the subject-object split in Cartesian ontology. With regard to the idea of object-categorization, researchers nowadays seem to have a hard time choosing a side. For instance, Rochat (2002) argues that whereas an object-in-itself should possess some kinds of “categorical attributes,” object-categorization is essentially a mental constitution based on the infant’s ability to “perceive the invariant commonalities of things in the physical world” (p.117). The infant’s perceptual experiences are stored as basic-level representational units (Eimas and Quinn, 1994), which then become the foundation of more advanced and abstract level of categorical representations. Some researchers, however, do not consider these representations as “conceptual” in nature—infants do not necessarily understand the meaning and boundary of a category. Although a distinction has been made between perceptual and conceptual categorizations, the ontological presuppositions remain unequivocally dualistic.

What made two exemplars similar to the infants is the key question in this experiment. Dualistic thoughts offer two competing explanations for the perception of

similarities. The empiricist's explanation views similarities/resemblance in terms of a natural tie between two objects with similar physical attributes: a *de facto* relation between similar things in the objective world that thrusts into our mind. The intellectualist's account conceives similarities/resemblance as an exclusively mental or cognitive constitution. Physical objects are meaningless in themselves, and it is the mind that draws some of them together as a group or category.

In addition, there is also a temporal aspect of the experiment to be addressed. Grouping a former exemplar and a current exemplar on the screen brings memory into question. Dualistic thoughts resort to representationalism for an answer. The representational perspective views that a copy of each exemplar is made and stored within the mind. In the experiment, the infants either somehow "figured out" there was a factual similarity between them, or actively "constituted" them as such based on some preexisting categorical schemas/concepts. Hence, for the infants who had been grouping the horses into a category during the initial trials, they were able to identify the new zebra exemplar as a violation of this category, be it conceptual or perceptual in nature.

From a nondualistic perspective, it is important to examine both the empiricist and intellectualist's accounts. The subject-object dualistic framework suggests that either the subject determines the perception of resemblance (intellectualism) or the objective resemblance between two objects produces such perception in the mind (empiricism). For a deeper understanding of the experiment, it is necessary to have a closer look at what might have taken place during the experiment.

Ironically, the central experimental paradigm in this study, the process of habituation, is a testimony against both accounts. On the one hand, habituation would

not have occurred if the infants were exposed to a series of random exemplars. In other words, there seems to be things in the world that are more likely to be grouped together for the infants, otherwise habituation would not have been possible at all in this experiment. Nevertheless, it is clear that infants do not simply have the power to constitute any two things as similar (i.e., the “subject” does not determine categorical perception). On the other hand, habituation would have been an unnecessary experimental procedure if the resemblance between two exemplars was already an objective fact in the world, independent of human intentionality. The underlying category should have been thrust into the infants’ minds immediately, and habituation would have occurred instantaneously (i.e. the “object” does not determine categorical perception). To sum up, whereas we cannot deny the possibility that some objects in the world might be more likely to be grouped together by human infants, it seems that these “categorical attributes” are not independent of human intentionality.

Reflecting on the Habituation Process in the Study

In order to provide a more thorough contextual reinterpretation of this study, the right place to begin is a reflection of the phenomenon of habituation. Habituation is an experimental process by which the participants gradually lose visual attention toward repeated presentation of the same thing or similar things. From a phenomenological perspective, the research studies using the habituation-paradigm would in fact actively structure the infant’s phenomenal world—in a somewhat unnatural way. Why? In nonexperimental situations, infants are generally not physically positioned in such a way that their eyes would fixate on the same area where a variety of objects occur in order. Also, in the experiment, the screen that was placed in front of the infants, as the primary

light source in their visual field, was irresistible to the natural inclination of their visual system.

In their natural habitat, infants do not get coerced into witnessing repeated presentations of the same/similar objects, to the extent that their lived-world gradually becomes uninteresting and dull (e.g., it was indicated by their gaze diversion as noted in the experiment). Infants generally have more physical freedom to fixate their gaze on a variety of objects, which was significantly limited by the experimental situation. Having said all these, the main point is that the process of experimental habituation brings about a transformation of the infant's lived-world.

The habituation-dishabituation paradigm has a unique feature that often goes unnoticed. Unlike other experimental paradigms, in which the primary feature is the participant's direct behaviors toward an object or a presentation, the habituation procedure actually *manufactures* the behaviors that are supposed to be observed from a removed, scientific vantage point. One cannot help but to wonder if research studies based on this paradigm are actually revealing the phenomenon of habituation and dishabituation, rather than the hypothetical underlying cognitive or perceptual capacities.

Reflecting on the Infants' Experience in the Study

From a phenomenological perspective, this experiment describes how infants organize their sensory experience according to their particular situations—in fact, this is a unified subject-object view of perception. More specifically, it demonstrates how the infants organized their perception of a series of animal exemplars in the context of the experiment. These exemplars were presented one after another, but the infants clearly did not experience them as isolated instances of visual experience.

What was the basis of this perceptual organization? It was believed that the infants were being habituated to the category of an animal, whether the process was based on perceptual characteristics or conceptual boundaries of the animal. However, there was little consideration on the role of habituation in the gradual formation of this category, so to speak.

As discussed in our reflection of the habituation process in this experiment, habituation is only possible if the “stimuli” (e.g. different exemplars of horses) were somewhat “generalizable,” that is, there must be some potential “commonalities” shared by these exemplars. On the one hand, if each exemplar was “different-enough” than the former one, habituation would have never occurred. On the other hand, habituation would not have been possible if the exemplars were not generalizable, which means that some exemplars must share some “commonalities” that can be potentially generalized. It follows that the infants must have been somewhat “motivated” to pull these shared commonalities together.

This motivation, as discussed before, was based on the displeasure associated with watching some similar objects over and over again. In response to this situation, the infants pre-reflectively drew on the generalizable features of these exemplars¹³, so as to enhance their attunement to the next “different-enough” exemplar. This pattern of perceptual organization is explainable by their basic inclinations to generalize and “average” their experience (e.g., Stern, 1985, p.195). Thus, at the most basic level, perceiving two things as similar provides a simultaneous apperception of their “averaged” version, which does not necessarily indicate an overarching category. Furthermore, the

¹³ These “generalizable” features could very well be the foundation of later development of these animal categories.

infants' continuing effort to generalize the horse exemplars eventually stopped as they were no longer paying attention to the introduction of new horses, indicating that the habituation criterion had been met.

The "horse-habituated" infants were not actively putting all of the horse exemplars into a group, inasmuch as they were becoming progressively inactive (this is what habituation means after all) because the new horses no longer had *attention-worthy* features. Furthermore, this process also heightened the infants' sensitivity to novel sensory experience; hence, they regained their visual attention immediately when a zebra exemplar was presented. They saw in the zebra not an object that violates the category of horses, but its "different-enough" perceptual features or forms that immediately summons their attention. In other words, the infants demonstrated not an act of categorizing objects into a group, but a reactive manner of perceptual organization in a very unique but somewhat unrealistic experimental situation.

This phenomenon speaks to how infants cope with their situation by reorganizing their perceptual patterns. Hence, from a unified subject-object perspective, their perceptual organizations are closely tied to their bodily inclinations and interest. As embodied beings always situated in a world, their bodies are always in the process of coping with different situations. This experimental situation altered the infants' bodily inclinations and interest, and the infants pre-reflectively coped with this by reconfiguring their perceptual organization—avoiding exemplars with similar features and seeking for the next attention-worthy exemplar.

This experiment might have proven that infants "can" categorize by dampening their level of visual reactivity. Metaphorically speaking, they were "categorizing" in

order to lessen the torture of boredom, while enhancing the potential excitement upon seeing the next “different-enough” exemplar. From a phenomenological point of view, habituation propels a person into seeking for something new and different. The habituation process decreases one’s inclination to seek for similarities, and heightens our reactivity to novelties. Thus, to a certain extent, the infants in this experiment were “trained” to categorize, and the sign of dishabituation only revealed a successful training. In this sense, the experimental outcomes do not suggest that infants are either living in a categorical world, or carrying some internal conceptual schemas that constantly divide the world into discrete categories.

Categorizing in the Natural Habitat?

From a phenomenological perspective, it would be important to ask if experimental situations reflect infants’ natural habitat, because empirical observations in these contexts might not be ecologically-valid enough to substantiate ontological claims. Again, the experiment cited in this section does not support the idea that infants perceive discrete categories in their natural settings, whether it is based on internal conceptual schemas or factual properties of the external world.

In our effort to reinterpret the experiment from an experience-near point of view, we have found no evidence indicating that infants are preoccupied with a mental project of grouping the objects into discrete categories—whether it is based on external “categorical attributes” of the objects, or internal “conceptual schemas” inside the mind. Thus, we do not believe that this ability to “perceive the invariant commonalities of things in the physical world” represents the focal point of infant’s conscious existence in their natural habitat. The question remains whether or not infants would perceive discrete

categories in their naturally habitats. Hypothetically, as an infant crawls into a room with an array of objects everywhere, does she naturally and immediately perceive groupings or categories in the room? Currently, we cannot address this question strictly based on experimental studies such as the current one in discussion.

Nevertheless, our analysis in this section brings up a major principle that would guide further explorations about infants' perception of similarity or resemblance, as well as the formation of conceptual categorizes.¹⁴ Simply put, if infants have the ability to draw together the commonalities of the things in the world, this ability is not independent of their bodily inclinations, capacities, interests, and desires in a particular situation. As discussed before, the young infants' attention is characterized by a continuous flow that constantly redirects their focus. Accordingly, there must be some "motivations" for them to group and categorize things in natural settings. This "motivation" was discussed in the particular context of the current experiment. From a unified subject-object view, the infants were only grouping or categorizing the animal exemplars as a manner of coping or dealing with a particular situation. In their natural habitat, infants only identify a current object as similar to/different from a former object insofar as it calls for a certain manner of acting toward it (see the next two chapters for more examples).

Certainly, it would be counterintuitive to suggest that infants are not born with some innate inclinations to perceive similarities and/or differences; otherwise, the well-documented familiarity-and-novelty-seeking behaviors would be inconceivable.

Nevertheless, this inclination cannot be understood as independent of the broader

¹⁴ From a phenomenological point of view, the perception of two similar things does not necessarily presuppose the existence of a conceptual category; and, the grouping of things based on a conceptual category does not necessarily require the perception of similarities.

contexts of their situation, as demonstrated in our discussion of the habituation process.

In addition, perceiving two objects as similar to each other does not necessarily indicate an overarching category with firm boundaries. In general, we agree with the consensus that the young infants' perception of similarities/differences is more likely to be based on basic perceptual features, such as form, size, shape, color, and so forth. For example, at the sensory level, two blue circles of slightly different size might produce a very similar pattern of neuronal firing in the visual cortex. Nevertheless, for an infant who crawls into a room with an array of objects, there is no evidence that seeing a blue circle would propel her to look for another blue circle in order to arrive at a perception of similarities, or to continue building up a category of "blue circles" whether it is based on sense impressions or the concept of blue circles. There is no doubt that the topic of object-categorization involves many theoretical, conceptual, and developmental issues that cannot be thoroughly addressed here. Our major goal is to deconstruct the rationale of taking this frequently-cited experiment as the supporting evidence for both its dualistic explanation (with representations) and ontological portrayals (of a mind that categorizes, and of a categorical world).

Chapter 3

Infant's Bodily Intelligence: Learning without Representations

3.1. Introduction

Although subject-object dualism is the major theme in the previous chapter, it is evident that the “body” has repeatedly found its way into our exploration of the infant’s grip of the objects in the physical world. In fact, it is difficult to articulate the infant’s intertwined relationship with the world without making reference to the body. In this sense, Merleau-Ponty (1962) is correct that a genuine phenomenological project is incomplete without making reference to the primordial embodied situation of human beings.

Cartesian dualism not only suggests a subject-object split, but also an ontological bifurcation between a mental entity (i.e. mind, psyche, or consciousness) and a purely mechanical body. This mind-body dualism is traditionally considered as an issue of the “self”: an isolated individual being is further split into two separated units. According to Descartes, the mind and the body are two separate entities with distinct features or substances. The mind is mental and somewhat disembodied, whereas the body is purely materialistic. The mind and the body interact in the “pineal gland” as Descartes originally suggested.

It seems that Descartes was attempting to locate mind-body interactions within

the body itself. Nonetheless, the body he envisioned was a *mindless* physical entity. In contemporary psychology, we can continue to see the prevalence of the idea that the mind and the body are of two different substances: mental and physical. Many psychologists today would reject the idea of a disembodied mind. Their sentiment, however, is often based on an appreciation of modern brain-scanning technologies, which provide an “inside view” of neurological processes in the brain that are considered as the same as mental activities. As a result, some new versions of the mind-body dualism have emerged in recent decades.

On the one hand, some psychologists often argue that the mind is not real; it is nothing but an epiphenomenon produced by the neurological processes within the body. This version of biological reductionism has purposefully disregarded the seemingly elusive notion of the mind, consciousness, or subjectivity. As a result, human existence is reduced to “the exclusive terms of pure physicality” (Stolorow & Atwood, 1992, p.9). This is often known as physicalism in philosophy. Psychologists without a strong position on this issue might continue to speak of the mind and the brain interchangeably.

On the other hand, in contrast, some psychologists often retain some versions of a constituting mind or self-consciousness. The mind, or the psyche, despite its biological basis, actively gathers and organizes information received from the external world. Because the mind seems to organize the world in such complex ways that cannot be readily decoded and interpreted from the brain scans, the cognitive camp in psychology has assumed the responsibility of discovering the mental secrets. Nonetheless, the cognitive mind is still Cartesian at its core for it continues to rest on the ontology of a self-world bifurcation, and the split between inner subjectivity and external objectivity.

There are two major versions of the mind based on this self-world split. First, the mind represents the world as it really is, and the objective world basically impinges its “facts” onto the mind. Second, in contrast, the mind is the constituting agent that constructs the world based on some innate programs or perceptual patterns, and the world is not fundamentally meaningful by itself. In either case, the mind is considered as “embodied” insofar as there is a brain inside the body. Likewise, the body is only “minded” as long as a brain resides within it. In both cases, the location of intentionality remains in the interior, as an internal entity, whether we call it the brain, the mind, or the psyche. This creates an ontological sub-bifurcation between the body-as-subject (constituting mind) and the body-as-object (physical body), the latter of which is subjected to be surveyed and manipulated by the first. This seems to be the contemporary version of mind-body dualism implicit in the psychological literature.

To recapitulate, the contemporary model of the mind is believed to have a neurological (brain) basis, surveying and exploring the world of objects including its own body and other animate beings. Although the mind is no longer disembodied in the classical sense of Cartesian dualism, the body-as-subject and the body-as-object remain to be fundamentally separated. The mind, or the-body-as-subject, still possesses everything associated with the interior of a Cartesian mind, such as internal schemas to organize and categorize the external world of objects and other human beings. In addition, there remains a mindless body that is purely physical, which is independent of a neurologically-based mind that possesses the cognitive power to survey the body as an object. Under this contemporary version of mind-body dualism, the infant is portrayed as a premature scientist, with an internal mental entity that makes copies of the objects in

the world, and forms representations that give rise to some expectations and predictions about the world.

In this chapter, we contend that this ontological split between a disembodied mind and a materialistic body renders learning and intelligent behaviors inconceivable, without some forms of internal mental representation. Thus, the major goal here is to develop an understanding of intelligent and learned behaviors without representational concepts. Accordingly, we will discuss a variety of experimental observations on infant behaviors that indicate learning, memory, and intelligence. Unlike the previous chapter in which our reflection is mostly grounded on infants' visual attention and eye movements, the behaviors cited in this section involve more active and deliberate actions such as reaching with hands.

3.2 Bodily Intentionality

Developmental psychologists generally conceive infants' bodily engagement in the world in terms of some kinds of action-theory: oral, manual, and visual object-exploratory behaviors imply a process of knowing the world through immediate actions. However, infants not only demonstrate immediate practical knowledge of the world, but also memory-based intelligent actions and learned behaviors. Hence, infant psychologists seek to look beyond action-theory for an explanation for these higher-order behaviors.

Piaget's resolution was essentially a representational explanation, which has undergone many theoretical modifications over the years. However, the core notion of a

representational mind is still widely shared by contemporary developmentalists.¹⁵ As discussed before, the dominance of a Cartesian mind—inhabited by its mental furniture—in the mainstream of psychology, makes it nearly impossible to conceive a nonrepresentational explanation for the transition from the immediacy of perceptual experience into the territory of more advanced intelligent behaviors.

Furthermore, the age-old constructivist versus nativist debate is also built upon the Cartesian model of mind: whether mental representations or cognitive schemas are developed entirely on the basis of accumulative experience or some innate conceptual forms? In either case, a “middle” entity (i.e. the mind) is required to bridge the gap between the body and the external objects. This is because the body is considered as secondary to the mind, in which intelligent and learning behaviors must originate. If the body is acting toward objects in a meaningful and intelligent way, it is only because some innate object-concepts or newly developed mental schemas are guiding its actions.

A “Coupled” Body-World Perspective

In order to establish an account for learning and intelligent behaviors without representations, it is crucial to first elucidate the notion of intentionality in terms of the body. Bodily intentionality suggests that the body is never simply a biological machine governed by either innate programs or cognitive schemas. There are several ways to discuss the idea of a primordial bodily intentionality.

From a phenomenological point of view, the body and the world are one intertwined system from the beginning of life. The body is fully intentional and purposive because it is “coupled” with the world. This is not to say that, however, all

¹⁵ Arguments against Piaget are often directed to the constructivist aspect in his theory of knowledge acquisition, most vigorously by the opposing nativist view (e.g. Spelke, 1991).

individuals necessarily experience the world as unified with their bodies. As adults in contemporary societies, we gradually develop a more removed attitude to observe the world. For example, Wapner and Werner (1965) discuss a series of experiments concerning the relation between our body and perception. One of these experiments deserves special mention because it shows that what is often conceived as the fully-determinate objective reality is not isolated from our “body attitudes.”

In this intriguing study, two “body attitudes” were introduced to two groups of adult participants. In one group, the participants were asked to adopt the normal attitude of looking at an object as “out there,” unrelated to the body. In the other group, the participants were asked to “feel” themselves as fused with the object. It was shown that the participants were fixating their eyes on different parts of the same object according to the “bodily attitude” they were asked to adopt. The researchers suggested that these two opposing body attitudes brought about two differently-organized visual perceptions, although the visual presentation was “objectively” the same. Which one of these “attitudes” is a better reflection of the infants’ lived-world as demonstrated in experimental research and observations? Infant research seems to suggest that the human body is innately coupled with the world, because it shows that the infants’ body always corresponds to a changing world. For instance, Lewkowicz and Turkewitz (1980) showed that the heart rate of three-week-old infants would change according to the temporal correspondence between the levels of sound intensity and light intensity. It was suggested that infants seem to naturally expect certain levels of sound intensity to correspond with certain levels of light intensity.

Regarding the body's relationship with space, the dualistic approach cannot get past the tension between the space of causes and the space of reasons (McDowell, 1993); that is, whether the world is causing the body to react, or the mind is constituting space based on some cognitive frameworks. Both perspectives are derived from the mind-body problem rooted in Cartesianism. Alternatively, Merleau-Ponty (1962) offers a nondualistic notion known as the space of motivation: "[I]n perception we do not think the object and we do not think ourselves thinking it, we are given over to the object and we merge into this body which is better informed than we are about the world, and about the motives we have and the means at our disposal" (p.250).

This phenomenological view of space presents a unified idea of the relationship between the body and the world. On the one hand, the infant's increasingly advanced motor capacities, visual tracking abilities, and bodily desires continue to actively structure the practical space, as discussed before. On the other hand, the infant's body also directly responds to any changes or reconfigurations in space. For instance, the infant's ability to locate an object in space is generally guided by what researchers called the auditory-visual correspondence. In one research study, it was shown that infants were sprung into defensive reaction/reflex in response to a looming object on a collision course with his face (Bower et al., 1970). In a different experiment, a group of two-month-old infants sat in a room where the walls gradually approached or receded, and it was observed that they were constantly reorienting themselves with head and postural movements in response to the constant changes of space (Gibson, 1966).

Affordances and Embodied Coping

The notion of affordance has been discussed previously in order to reveal the primordial subject-object intertwined relationship that precedes both the subject's intentions and the object's fixed features, drawing them together as a meaningful form of human behavior in context. For instance, a ball can afford many motor possibilities: rolling, squeezing, dribbling, or throwing. Nonetheless, we do not perceive these possibilities upon seeing a ball, and then consciously pick the one that best fits our interest. Nor does the ball carry in itself some objective features that solicit the same reaction in every one of us. If we end up throwing the ball at the wall, it is this throwing action that clarifies and specifies the subject-object relationship, because we clearly do not possess the omnipotence to transform every ball-like object in the world to be a "throwing-friendly" thing, nor does every such object in the world have an irresistible enigma that drives us to throw it.

Precisely because newborns directly perceive affordances, which are inseparable from their innate exploratory dispositions and motor capacities, they demonstrate what is known as "pre-reaching" behavior. Prior to the development of advanced hand-eye coordination and the motor ability to grab objects, newborns show frequent forward arm movements while tracking a near object moving in front of them, as discussed before (von Hofsten, 1982). From a phenomenological point of view, the infants' body is sprung into action the moment an object falls within reachable distance, showing that the human body is a thoroughly intentional system inherently connected to the world.

Taken into consideration of the historicity of the "subject" who perceives affordances, it is important to rethink the connection between learning/memory and

affordance perception. Dreyfus (2002) offers a nonrepresentational account for learning and intelligent behaviors, based on the ideas of skillful perception and embodied coping. What is the relevance of affordance to the notion of embodied coping skills? As embodied coping agents already engaged in the world, we do not respond to things as things but directly and skillfully as *affordances*. Hence, we do not perceive affordances as the objective background that gives rise or delimits possibilities of bodily actions—in other words, affordances are not “in” the objects or “out there” in the world. Rather, it is crucial to situate the notion of affordances in a nondualistic ontology.

Merleau-Ponty (1962) also suggests that the lived-body is drawn to get a maximal grip on its environment: “[The] body is geared into the world when my perception presents me with a spectacle as varied and as clearly articulated as possible, and when my motor intentions, as they unfold, receive the responses they expect from the world” (p.250). In this sense, everyday human coping cannot be understood in terms of symbolic representations, and of responses caused by fixed features of the environment:

We need to consider the possibility that embodied beings like us take as input energy from the physical universe and process it in such a way as to open them to a world organized in terms of their needs, interests, and bodily capacities without their minds needing to impose a meaning, nor their brains converting the stimulus input into reflex responses (Dreyfus, 2007, p.251).

According to Dreyfus (2002), the embodied agent acquires skills through successful and adaptive coping experience. These skills are both perceptual and action-oriented—they are “stored” not as representations, but as solicitations of situations in the world. In other words, what we acquire through experience is not “represented” but directly presented to us as more refined and discriminated situations. Embodied coping skills are acquired through a process of increasingly discriminate perceptions and refined bodily responses.

In this sense, the clarity of affordances, which defines the level of refinement in our skillful perception and action, is a result of successful embodied coping or learning. In addition, it is worthwhile to mention that this nonrepresentational perspective on learning has received some empirical support from neuroscience—in particular, as Dreyfus (2007) notes, the work of Walter Freeman on the nonlinear dynamic system based on circular causality of the human brain.

Corporeal Schema and Vitality Affects

As an embodied agent, the infant is fundamentally aware of herself in both motoric and emotional/affective dimensions. First, proprioception refers to the awareness of one's own bodily movements. Rochat (2001) offers a more scientific definition, according to which proprioception is “the act of perceiving based on information carried by receptors in contact with muscles and at the joints, which provide on-line tracking of the variations in tensions and torque”(p.35).

Infants are not only aware of proprioceptive information, but also of their motor capabilities/limitations in specific contexts. Rochat et al. (1999) designed two research experiments to demonstrate this awareness. In the first experiment, they showed that infants have a precise awareness of their motor limitations in relation to the objects that are either out of reach or too dangerous to try. In the second experiment, they found evidence of the same motor awareness when additional physical constraints were put on the infants. A group of five to sixth-month-old infants wore either light (2g) or heavy (200g) bracelets on their wrists. According to the researchers, whereas the heavy bracelet was not enough to suspend the infants' arm movements altogether, it should have limited how far forward they could lean without losing balance. As expected, the infants were

perfectly aware of their motor limitations in relation to distal objects, as evidenced by the fact that they did not attempt to reach for the far-away object as frequently as they did for the closer object.

Stern (1985) brings up a second dimension of embodied awareness, by distinguishing between categorical and vitality affects. Categorical affects are the experience of more discrete forms of emotions such as depression, sadness, anger, and so forth. Vitality affects, in contrast, describes the ways and contours of emotional activation, including our own visceral feelings and the basic bodily awareness of vitality. In addition, according to Tomkins (1962, 1963), emotions are the private experience of nine different innate affects. These affects are physiologically-based but inextricably linked to perceptual elements such as images and sound. Together, they form a meaningful experience (or, a script) that signals to us that something is significant. Hence, one of the major functions of affects is making us care about what is happening. In this sense, affects can be considered as the heightening of embodied awareness.

The Embodied agent and Practical Space

The notion of space in psychology reflects a classical confusion between its own subject matter with that of physical sciences in which space is objectified. This mix-up has inevitably led to a view of the body as a point in objective space. Accordingly, spatial structures are fundamentally independent of and separated from bodily structures. The notion of bodily intentionality brings about a major challenge to the concept of objective space. According to Merleau-Ponty (1962), having a body is equivalent to having a world, and the lived-body is synonymous to the lived space: “to be incarnate is to be in the world and of the world; it is to be part of the domain it surveys” (Dillon, 1997,

p.139).

The infant's lived-space is oriented around both the physical capacities and limitations of her body, as well as her inherent motivation to undertake motor projects to fulfill her needs. Hence, the body is very much "minded," so to speak. The body has a primordial intentionality precisely because it is inherently coupled with space. The space of motivation transcends the duality between objective space and mental/subjective space, and allows for a nondualistic framework of embodied learning: "our environment and body work together to dispose us to particular ways of acting and experiencing. The world works by drawing on our skillful bodily dispositions" (Wrathall, 2005 p.118). To sum up, the body is originally and thoroughly intentional. It has its own intentionality prior to any cognitive or mental operations.¹⁶ All bodily actions can be conceived as "consisting movements that are both immediate and, at the same time, purposive (hence intentional)" (Dillon, 1997, p.135).

At this point, it has been established that the body is primordially intentional, coupled with the world, responds directly to spatial changes, and actively structures the practical space. Nevertheless, the notion of embodiment breeds a common misconception in the mainstream of psychology: the intertwined body-world perspective is considered valid insofar as the embodied agent has direct perceptual access to the immediate world, here and now. Otherwise, some might wonder how the body can be intentional, coupled with the world, and structure space, without an immediate contact with this world.

In other words, the "coupling" is assumed to be suspended temporarily when

¹⁶ The fact that bodily actions are always purposive and directed to objects indicates the inseparability between "intentionality"/consciousness and the human flesh, as Dillon (1997) suggests.

objects are out-of-sight, so to speak. This is exactly why overcoming subject-object dualism is insufficient for a thorough revision of the ontological misconceptions in the literature. A superficial recognition of bodily intentionality does not necessarily rescue the body from being trapped within immediacy. As a result, empirical evidence of memory and learning has often been attributed to the working of cognitive or mental processes.

For example, what if infants have no visual access to the world as in darkness, but they seem to remember the precise manners in which they have reached for some objects in the light? Does it not indicate the existence of some visual representations that have been “stored” and “reactivated”? What if infants are able to learn how to use their bodily actions to “control” some aspects of the world? Does it not imply that there is an overseeing mind using the body as a physical tool in order to control the external world? In addition, what if infants are able to “remember” from a past experience what they need to do in order make something happen in the world even after a long delay?

In order to overcome mind-body dualism in the literature, it is very important to deconstruct the belief that memory and learning, traditionally conceived as mental functions, are beyond the capacity of an intentional body. Some of these questions have been discussed in the previous chapter. Nonetheless, with the mind-body problem as the current focus, our approach here takes on a new theme. We will discuss several experimental studies that indicate infants indeed behave intelligently beyond immediacy, which means that some kinds of learning, adaptation, or memorization do occur at the level of embodiment. The major challenge is to show how the “lived-body” can offer an account of learning or intelligence without representations.

3.3 Intelligent/Learned behavior I: Reaching in the Dark

“Reaching in the Dark” Study (Clifton et al., 1991)

We presented six-month-olds either a large (thirty centimeters in diameter) or a small (six centimeters in diameter) donut shaped object for reaching and grasping. In alternated trials, each object was presented first out of reach and slowly moved closer to within reach in front of the infant. During the trial, each object was shaken by the experimenter to make a particular sound: either a jingle bell or a rattle. Following six presentations of the objects in the light, we then turned the lights off and presented again each object that the infant could only hear, not see. We videotaped infants in pitch darkness using an infrared camera and coded their reaching activity toward the object (Rochat, 2002, p.98).

There are a few popular assumptions associated with this experiment. The researchers suggest that infants are able to reach in the dark because they are guided by some specific object-concepts or representations of the visually-absent object. Otherwise, the infants’ persistent reaching in the dark would not make sense, for there is no visual information guiding their manual search. Furthermore, it has been suggested that using an occluder to block infants’ direct visual contact with an object and turning a room into complete darkness are comparable experimental conditions, because there is no visual feedback in both scenarios.

Such a generalization ignores some major contextual and experiential differences between two unique phenomena. From a phenomenological perspective, we are interested in the ways in which infants engage in space without visual feedback from the world. For most researchers, internal representations jump out as an appealing answer. They believe that infants can mentally “represent” objects in their visual absence, because they possess a cognitive mind which is the only thing capable of making permanent copies of the objects.

Visual Absence and World-Disappearance

Let us first reflect on the infant's experience in both cases. In the condition in which there is an occluder blocking the infant's visual access to a toy, the "visible inaccessibility" is only specific to the toy itself. The infant continues to be firmly anchored in a visible world, and her actions are guided by the visible space. In the condition where the disappearance of an interesting object is due to darkness, the cut-off of visual access is not specific to the original object of interest. When the light is turned off, the infant experiences a sense of global darkness. She no longer exists in a visible world, so to speak, which presents to her a relatively handicapped situation in undertaking any potential motor projects. Thus, research has shown that infants are generally more active in the light than in darkness, as they always tend to reach more frequently in the light in terms of mere numbers of attempt (e.g., Clifton et al., 1999).

Does it mean the infant's world has temporarily disappeared in the dark? Does immediate visual perception matter to the extent that darkness would completely take away the infant's sense of space? In other words, does visual absence mean world-disappearance? According to Merleau-Ponty (1962), the notion of lived-body suggests that our body is always engaged in space: we have a fundamental sense of spatiality even if we cannot "see" our body and the surrounding objects. Eyes open or not, the infant's access to the world is not eradicated by darkness. When the light is suddenly turned off, the darkness simply reconfigures the infant's relationship with space.

In order to substantiate this claim, let us first look at the more detailed descriptions of the study. The infants in the experiment were firmly anchored in space, with an experimenter or a parent supporting their back. They could reach with forward

arm movements freely and safely. Before the light was turned off, these objects provided visual appearances, moved in and out of reach, shook and made sound, and were touchable. From a phenomenological standpoint, when the perceived object is viewed as a phenomenon unfolding through space and time in-relation-to-the-subject, its carnal existence should no longer be reduced into mere visual appearances. During initial trials of the experiment, the infants already established an integrated grip of these objects as visual, dynamic, sound-making, and touchable—all inseparable aspects of their phenomenal existence. When the light was turned off, the invisibility of these objects did not completely eradicate their carnal existence for the infants.

Some empirical evidence also seems to support this idea. Rochat (2001) notes that there are two general factors that make infants more likely to reach in the dark: witnessing the object/toy before darkness is introduced, and hearing the sound produced by the object/toy in darkness. The first condition nullifies the hypothesis that visual absence would bring about world disappearance. Although many infants do not attempt to reach at all in the dark, for a combination of factors such as visual disorientation and fussiness, it has been shown that fixating on an object of interest (e.g., a toy) immediately before darkness would significantly increase reaching behaviors, in comparison to conditions where no toys are presented. From a phenomenological perspective, this is the evidence of the infant's unequivocal conviction that the object is "still there" and their spatial relationship remains intact. The second condition testifies to the primacy of auditory space in darkness. When an object makes sound in the dark, it provides the infant with an auditory confirmation of its carnal existence, as well as an auditory sense of distance. Thus, even without seeing the object before it disappears in darkness, the

infant perceives in the sound that “the object is there.” As some researchers have suggested, sound-making objects does provide a sense of distance—within or beyond reach, that guides the infants’ reaching attempts (e.g. Clifton et al., 1991).

Differential Reaching in the Light

Many infant researchers are intrigued by the fact that the same two factors do not increase infants’ likelihood to reach in the light condition. In one study (Shinskey & Munakata, 2003), the infants were exposed to two different experimental trials: “cloth-no toy” and “cloth-toy” conditions.¹⁷ The researchers found that the infants actually reached more during the “cloth-no toy” trial than in the “cloth-toy” trial (Shinskey & Munakata, 2003). In general, it is suggested that when exposed to either a cloth on the floor or the same cloth-as-occluder covering a toy, most infants tend to reach more toward the no-toy cloth. When a cloth is placed on an empty surface, it is the only object of interest available to the infants. Hence, the infants directly perceive the cloth’s affordance as a touchable object within a reachable distance.

In contrast, when a toy is presented first as the original object of interest, the infants are immediately caught up in its affordance as the touchable object within a reachable distance and in the motor projects it summons. In this case, the impact of the covering cloth is in demolishing the toy’s affordance; hence, the infants are not motivated to reach for either the occluding cloth or the hidden toy. Hence, the infants tend to reach more for the cloth when it is presented alone than the cloth as an occluder. This also explains why witnessing the toy being hidden under a cloth does not increase their

¹⁷ In the “cloth-toy” condition, a toy was presented first as an interesting object within a reachable distance; then a cloth was introduced as the object that completely covers up the toy. In the “cloth-no toy” condition, the same cloth was presented alone as the only object within a reachable distance.

likelihood for reaching.

In the “cloth-toy” condition, the infants’ likelihood for reaching for the hidden toy also does not increase by hearing the sounds created by the toy underneath. In order to explain why this is the case, let us reflect on the infants’ experience in this situation. Why is the auditory input insufficient to invigorate a sense of the toy’s carnal existence as a visible and touchable object? First, the hidden toy’s sound occurs in a visual world with multiple objects and rich layouts in the background, unlike in the dark where auditory experience clearly stands out. Research has shown that multiple visual objects can compete for the infants’ attention, weakening their focus on a particular object (e.g., Rensink, O’Regan, & Clark, 1997; Simons, 1996). Second, as discussed in the section on object permanence, the bodily actions of young infants are closely tied to their immediate sensory experience. They are only capable of carrying out “concrete movement,” which is a fundamental vestige of the primordial bodily intentionality or “operative intentionalities” (Merleau-Ponty, 1962). Reaching for a sound-making object in the dark is an example of *concrete movement*. In contrast, in order to reach for the hidden toy under a cloth, the infants need to perform an “abstract movement” (Merleau-Ponty, 1962) by moving their arms toward the cloth so as to remove it in order to make the hidden toy reappear and be retrievable. However, the young infants lack the “intentionality of act”¹⁸ to carry out such movement (Simms, 2008, p.91).

¹⁸ The distinction between “operative intentionalities” and the “intentionality of act” is based on Merleau-Ponty’s (1962) explication of the difference between concrete and abstract movements. The first describes a primordial bodily intentionality that is inherently purposive and directed to objects, and its mission is to fulfill the body basic needs and interests. The latter describes a type of intentionality responsible for more willful and determined acts, which is also not independent of the body.

The following is good example of the difference between concrete and abstract movements: even though chimpanzees are intelligent enough to use a random branch as a tool to gather ants from small holes and are physically capable of breaking off a small branch from a tree, they do not immediately perceive a meaningful connection between the two. Thus, in a situation where they have no thin branch and fail to efficiently gather ants with fingers, they cannot perceive a nearby tree as a possible solution: the “abstract movement” of breaking off a branch from a tree to use it for gathering ants.

To sum up, without the capacity for abstract movements, the toy’s affordance for reaching is eradicated when covered by a cloth because the infants’ bodily desire to reach for it is abruptly extinguished. Also, the cloth that the infants perceive in the “cloth-no toy” condition is not the same as that in the “cloth-toy” condition. In the no-toy scenario, the cloth is the only object of interest available, thus motivating some reaching attempts of the infants. In the toy scenario, the introduction of the cloth eradicates the toy’s affordance as a reachable object; thus, the infants are less likely to reach for the cloth in this context. In addition, they could not readily perceive the cloth’s affordance for *revealing* a hidden object, which would require an ability to perform “abstract movement.”

Differential Reaching in the Dark

Returning to the original study, there was a key difference in the way in which the infants reached for the large object as opposed to the small object during the initial light trials (Clifton et al, 1991). The infants had both hands forward while reaching for the large object, and only one hand forward while reaching for the small object. These reaching patterns were replicated in the pitch dark condition, in which infants were only guided by the respective sounds created by the shaking of the large and small objects.

This particular finding led the experimenters to make the following interpretation: “such anticipatory manual reaches in the dark as meaning the infants used a representation of the object to guide their reaching in the dark” (Rochat, 2002, p.98).

The rationale of this representational explanation is as follow: the sound presented in the dark triggered a “match” inside of the infants’ mind, where a colossal collection of mental representations were stored. An exact visual representation was pulled out and projected into the dark room, providing the infants with the visual and spatial guidance for a specific manner of reaching. However, if internal mental representations can actually take over and replace the immediate world of darkness, one might wonder why we would generally reach in such a cautious and hesitant manner in the dark.

From a phenomenological perspective, it is grossly misleading to think of mental representations and the world in terms of a *copy-and-paste* relationship. The only explanation for why people would reach cautiously and hesitantly in the dark, even with a clear mental image of the object, is that the body never disengages from the immediate world. When visual access is unavailable, as in darkness, we directly cope with this relatively-handicapped situation as intelligent embodied beings. Dreyfus (2002) offers a nonrepresentational account for this kind of intelligent coping, which is based on increasingly refined and skillful perceptions and actions. According to this perspective, the infants’ differential reaching in the dark can be understood in terms of embodied coping skills. Because the infants were deeply anchored and engaged in the world, their attempt to reach in darkness was guided by the available sensory and spatial cues, which was a somewhat risky and difficult motor project. In the experiment, the infants did not need to look for these cues, because their intentional body was fully capable of

reconfiguring or reorganizing its functionality in response to a handicapped situation such as being in the dark.

In addition, the infants in the experiment not only seemed to know something is “out there,” but also exactly what was approaching them. From the perspective of embodied coping, we directly perceive affordances through other sensory modalities in response to a handicapped situation. In the same vein, the infants perceived through the objects’ sounds the affordance for a particular manner of reaching. They did not need to pull out the matching representation from their mental storage. Rather, they directly and immediately perceived the sounds as being able to “afford” a specific way of reaching for it in a more-or-less handicapped situation without a light source, cautiously and hesitantly.

In addition, the familiarization process in this research study provided the infants with plenty of visual exposure to both the small and large objects making two different sounds, beginning from a farther distance and slowly approaching them. During the familiarization trials, they experienced many successful attempts in reaching for these objects. As Dreyfus (1972) suggests, successful coping continually enriches the way things in the world show up for us. Through successful reaching during these initial trials in the light, the infants developed what could be considered as skillful perceptions and actions. Precisely because the infants had an intentional body that was capable of adapting to a handicapped situation such as being in darkness, they remained somewhat competent in perceiving refined discriminations and carrying out skillful, purposive actions. Thus, when hearing the familiar sounds in the dark, they were sprung into a specific reaching by the auditory input alone when the room turned into darkness. To sum up, the infants’ differential reaching, as a sign of intelligent behaviors, can be

understood from the perspective of embodied coping and based on the notion of affordances, without resorting to any representational concepts for an explanation.

3.4 Intelligent and Learned Behaviors II: Anticipatory and “Memorized” Actions

In this section, we will examine two research experiments that demonstrate infants’ intelligent and learned behaviors based on extended memory. In the first research study, a group of three-month-old infants were placed in a crib with a foot tied to a mobile by a string (Rovee-Collier et al., 1980). It was found that the infants quickly learned the positive correlation between their kicking frequency and the mobile’s movements.

Until eight days after the initial experiment, if the infants revisited the same crib with the same mobile—in other words, the exact same situation—they would begin to kick at a high rate even though there was no string and no movement of the mobile. There was a trick that could extend this seemingly learned/memorized behavior well beyond eight days: a brief visual exposure of the moving mobile before the experiment was repeated. In the follow-up experiment, the infants showed significantly less or virtually no kicking if a different-looking mobile replaced the original, albeit the crib and everything else remained the same.

Reexamining the “Mobile-kicking Experiment”

What is the basis of the infants’ understanding of the correlation between their kicking and the mobile’s movements—the “knowledge” that more kicking produces more movements on the mobile? The cognitive explanation would suggest that all infants possess an overseeing mind, which is capable of identifying patterns and contingencies in the external world, and control a physical body in order to maximize the sensory-

stimulating inputs. According to this view, the infants in the study gradually recognized the fact that the mobile's movement was contingent on their kicking. They used this knowledge to take control of their bodies as a tool in order to maximize the mobile's movement.

From a nondualistic perspective, the body plays an active and intelligent role in coping with the world. The body, according to Merleau-Ponty (1962), is drawn to achieve a maximal grip on its environment: “[It] is geared into the world when my perception presents me with a spectacle as varied and as clearly articulated as possible, and when my motor intentions, as they unfold, receive the responses they expect from the world” (p.250). There are indicators of intentionality in something as basic as eye movements; for instance, focal eye movement is an indicator of interest. To focus is to reorient the body in order to achieve an optimal view of the world. In other words, the body is always in the process of reorienting itself so as to get a maximal grip on the surrounding environment, and the world feeds back to the body what it desires and needs.

How do we then account for the “learning” that took place in the experiment from a nondualistic perspective? Infants' innate interest in movements is uncontested, and kicking as a predominant behavioral indicator of infants' excitement is well-documented. From a phenomenological view, when the infants were first put on a crib, they saw an interesting mobile hovering on top of them and began to kick more frequently out of excitement, making the mobile moves even more rigorously. It is also possible that the mobile began to move because of their random kicking, given that alert infants always engage in some random kicking motions. Either way, when the mobile's movement began to increase, the engaging infants became increasingly excited, resulting in even

more movements of the mobile. From an experiential point of view, the “learning” that took place here must be understood in the context of this circular feedback loop. In other words, it was inevitable for the infants to increase their kicking based on the fact that their legs were connected to the mobile through a ribbon. This kind of learning was not based on the infants’ cognitive abilities to notice patterns and invariants in the external world; instead, what they learned in this experiment was inseparable from their bodily interests and inclinations.

Thus, based on the setup of the study, the infants were not required to act as keen observers of the contingencies and patterns in the world. The mere observation of the infants’ increased kicking does not support the occurrence of any cognitive operations. The infants did not act as a little “scientist” trying to identify a connection between the kicking and mobile’s movements, and use that knowledge by manipulating the body in order to receive more visual excitement. Instead, this can be considered as another example of pre-reflective embodied learning, which is fully explainable by infants’ bodily tendency to achieve a maximal grip of the environment, without the working of any mental activities or conceptual knowledge.

The second question to be asked is more explicitly related to extended memory: when the infants came back eight days later, why did they immediately engage in high-rate kicking at the sight of the same mobile, even though its movement this time was not contingent on their kicking? Does this imply that some amount of knowledge about this mobile had been learned, stored, and remembered by the infants? What is an alternative explanation for this particular observation?

In order to address this question, it is essential to revisit the notions of direct

perception and embodied skills. The idea of embodied coping skills renders perception as fundamentally anticipatory and always tied to our bodily capacities and interests (Dreyfus, 1991). In order to best explain the immediacy of bodily actions observed in many infant research studies, the phenomenon of learning through experience/memory must be conceived as operating at the level of perception. Infants perceive an object in the manner of its becoming, through the historicity of their engagement with it, as well as their bodily inclinations, capacities, interests, and desires. In direct, immediate perception, the embodied infants perceive an object in terms of what they need to do for it to become what best fits their bodily interests and motility.

From a cognitive perspective that splits the mind and the body into two areas of functioning, the infants would need to first establish a complete visual perception of the still mobile, identify it as the same as the image stored inside their mind, and then recall and execute the required kicking activity that previously made the mobile move. In contrast, from a phenomenological perspective, when the infants came back after eight days of the original experiment, they directly perceived the mobile as that-which-will-move-vigorously, and this direct perception immediately propelled their bodies to kick frequently and excitedly. Based on experience, the infants seemed to have achieved a maximal grip of this situation, which was founded on their body's innate interest and desire for more movements.

Furthermore, witnessing the same moving mobile just before repeating the experiment was not only itself a familiar and exciting event for the infants, but it also reinforced their perception that this thing was the mobile-that-could-move-really-fast. They experienced the mobile not as an image that matches an internal representation, but

as solicitations for them to respond in certain manners. Thus, this brief exposure was able to extend this embodied “skill” well beyond eight days as noted by the researchers.

Also, in order for the findings in this experiment to be qualified as an example of skillful perception and action, it is also important to examine how perceptually refined and discriminatory the infants became after their first visit to the laboratory. As a matter of fact, it was shown that the infants learned to effectively discriminate the original mobile from a different-looking mobile, and showed no kicking efforts if the mobile was not the original one. Thus, their perceptual repertoire in this experimental context had become rather refined and discriminatory—or, in one word, skilled.

Reexamining the “Puppet Experiment”

The second research study that indicates learning based on relatively long-term memory is known as the “happy-puppet” experiment (Stern, 1982). In this experiment, a group of six-month-old infants were introduced to two hand-puppets, a frog and a rabbit. The infants did not have an emotional reaction, such as a smile, upon seeing them for the first time. The experimenters then used either puppet to play a game of peek-a-boo with the infants. Most infants, but not all, were smiling during the playful interaction with either the rabbit or frog puppet.

All the infants were brought back and shown both puppets a week later. Those infants who smiled before smiled again at the now-still frog or rabbit puppet, and looked longer at whichever puppet was used during the peek-a-boo game. In contrast, those who did not smile before did not smile upon seeing either puppet again; however, they looked longer at the puppet not used in the game (Stern 1982).

Lichtenberg (1991) raises a very interesting question about this experiment:

“[D]id the infants who smiled during the game smile a week later at the nonmoving puppet because they remembered smiling or because they saw a funny puppet”? (p.79) He argues that neither is a good explanation, because what the infants remembered was neither their own smiling nor a “funny puppet.” He proposes that memory and anticipatory systems work together to form a “perceptual-action-affective sequence” that is “remembered” and activated upon seeing a perceptual cue, such as the puppet that made the infants smile in the experiment. This is his version of how perception is tightly connected to bodily actions and affective experiences.

Nonetheless, the question he posed and attempted to answer is founded on a dualistic framework, and it is important to not be misdirected by it. From a nondualistic perspective, the infants did not smile because they remembered smiling a week ago, which would imply a reactivation of subjective, internalized memory. They also did not smile because they saw a funny puppet, because that would imply the “funniness” became a permanent, objective property of the puppet. From a phenomenological perspective, the immediacy of the infants’ behaviors in the experiment would require an alternative characterization that subtends both dualistic explanations.

Learning from social interactions is essential to infants’ adaptation in the world. Hence, the puppet experiment can be viewed from the perspective of embodied coping as well. For the infants who smiled before, most of them were sprung into smiling as soon as their eyes met the same puppet again. Seeing the puppet and smiling cannot be conceived in terms of cause-and-effect in either direction, because visual perception is potentially slower than motor actions as discussed before. If the infants had to first visually perceive the puppet, match its present appearance with an internalized image that

was encoded or remembered as the beginning of a fun interaction that happened a week ago, and then reactivate the same smiling response in their body, this “perceptual-action-affective sequence” does not seem to do justice to the immediacy of embodied coping.

However, the notion that the puppet showed up as a funny puppet is not far off, if conceived in terms of the body’s tendency to achieve maximal grip. From a nondualistic standpoint, it is not a question of whether the infants remembered smiling or saw a funny puppet, because they are not mutually exclusive interpretations. For the infant subjects, seeing a “funny puppet” a week later was precisely what it means to remember smiling the week before. For them, the puppet showed up immediately as clearly and unequivocally “funny,” and their body was immediately sprung into meaningful actions—engaging with the puppet through an immediate smiling gesture in anticipation of a sequence of joyful interactions. In other words, smiling at the funny-puppet-which-is-now-still-and-nonmoving was a revelation of their motor intention to receive the joyful responses they expected from it.

To sum up, the puppet showed up as a “funny puppet” not because memories had permanently altered an object in the external world. Rather, because the world is intertwined with the historicity of the infants’ bodily engagement in it, the still-puppet showed up exactly the way they needed to see it—as a funny one, for their bodies to immediately engage with it by smiling at it. Through the fun interaction with a puppet in the original experiment, the infants became more perceptually refined and discriminatory, bringing about more skillful and meaningful social actions during the subsequent experiment. Their smiling, then, was an indication of intelligent behavior based on previous successful, embodied coping experiences in social context.

What about the infants who never smiled? Why did they look longer at the puppet that was not used in the original experiment? To be considered as successful coping, motor intentions should be aiming toward adaptation. In general, there is very little positive gain from boredom, displeasure, or over-stimulation, which seems to be the case for the nonsmilers. Nevertheless, the experiment did lead to more refined and discriminated perception for the nonsmilers as well. In this case, seeing the uninteresting puppet again propelled the nonsmilers to engaging in an evasive action of immediately turning away from this “unappealing” object. Thus, when the nonsmilers were brought back a week later, they skillfully directed their gaze to a novel puppet that was directly perceived as potentially more interesting. Be it avoidant or novelty-seeking, such behavior was clearly a sign of bodily intelligence.

Lichtenberg (1991) suggests that perhaps memories are encoded in affective forms, “though never in isolation of the perceptual-action mode in which they are experienced” (p.80). Hence, for the baby smilers, the positive affect was remembered and reactivated the smiling response; for the nonsmilers, the negative affect was remembered and reactivated the looking-away or novelty-seeking response.

Nonetheless, we would venture that, in support of the thesis of bodily intelligence and skilled perception and actions, being affected motivates and organizes embodied coping. As Tomkins (1981) argues, the major purpose of affects is the amplification of experience. To amplify an experience is to make it an urgent embodied concern, reinforcing the body’s natural inclination to cope accordingly. As demonstrated above, the infants in the “puppet experiment” coped with their respective affectively-amplified experiences in very meaningful and intelligent manners: whereas the smilers were

motivated to initiate what was perceived as the beginning of a pleasant interaction through smiling and sustained visual attention; the nonsmilers were motivated to look longer at the novel object, partly as a quick termination of what was perceived as the start of a boring/unpleasant experience, and partly as an effortful search for something more interesting or pleasant.

In this chapter, we attempted to provide a series of nonrepresentational explanations that would account for the memory-based intelligent and learned behaviors as demonstrated in some experimental research studies. This endeavor was crucial to our effort to overcome mind-body dualism in the literature. In turn, we sought to offer a phenomenological reflection of the infants' experiences in the research experiments cited in this chapter, which can account for all the outcomes that the researchers found in their studies.

Chapter 4

Infant's social world: Intersubjectivity/Inter-corporeality

4.1 Introduction

Previously, we have established a nondualistic understanding of infants' physical/object knowledge by attempting to overcome the subject-object bifurcation, and of intelligent and learning behaviors based on the notion of bodily intentionality which deconstructs the mind-body split. In this chapter, the focus will transition into the social dimension of infants' existence, based on a reflection on some of the major ontological themes associated with selected experimental studies in this area.

In psychology, the traditional portrayal of infants' social world has not only been clouded by the classical Cartesian separation between self and others, but also complicated by remnants of the subject-object and the mind-body bifurcations. Although the notion of intersubjectivity has been discussed at length in the introductory chapter, it is worthwhile to mention some of its synonymous terms in Merleau-Ponty's philosophy (i.e., 1962, 1968); each of these notions represents his particular response to a different ontological theme or concern. As discussed before, intersubjectivity highlights his refutation against the self-other split that is a direct consequence of the Cartesian subject-object dualism—self as subject and the other as object. Intercorporeality brings the lived-body into the equation; an explication of intersubjectivity is insufficient without

a deep reflection on the human embodied situation. The mind-body dualism splits human existence into a mind that only performs mental operations, and a body that only acts mechanically like a machine. Consequently, it becomes the mind's job to constitute and store representations of the other. Lastly, Merleau-Ponty's articulation of the "flesh" accentuates the intertwining and/or reversibility between the self and others in perception.

The idea of human sociality corresponds to a conception of the world and ontology. If the world is conceived as an objective reality or an external space of physics inhabited by mechanical human bodies with a cognitive structure called the mind, then human sociality can only be understood in terms of external, objective interactive behaviors experienced internally by separate individuals, within the sphere of subjectivity. Accordingly, the self, or similar ontological constructs such as the subject (and subjectivity), consciousness, and the mind, becomes the building blocks for scientific and philosophical reasoning. Plenty of such examples can be found in the literature of developmental infant psychology. If, alternatively, a first-order communal world or reality is adopted, the study of infants' social existence might not necessarily start with a self or its equivalents.

The ontological separation between the self and others suggests a vision of human existence as originally individualistic; thus, the world is inhabited by beings existing in isolation. In the following sections, we will approach the tension between the dualistic and nondualistic frameworks of human sociality, through a phenomenological-hermeneutic analysis of a variety of infant research topics including: the perception of human faces and neonatal imitation, the perception of social causality or intentionality,

more complex forms of facial interaction, the ability to discriminate self from others, and internal representations of the self and others.

4.2 Perceiving the Human Face

According to Stern (1985), the perception of other human beings involves both constructionist efforts and the more global, amodal processes. On the one hand, he suggests that infants' perception of the human face is based on "constructionist terms," following a similar developmental progression of human visual scanning tendencies. Particularly, he notes that infants in the first two months tend to scan the peripheral, external features (contours and edges) of an object. Then, there is shift toward the "internal features" of an object. Hence, newborns initially experience the face as "no different from other objects that move, that are roughly the same size, and that have similar contour density." It follows that their perception of the human face is considered as an aspect of object-perception. He is very clear about the ontological consequence of this interpretation, according to which "the infant is not related in any distinctive or unique way to other persons" (p.63).

On the other hand, he also points to the evidence suggesting that infants might experience human forms in a unique manner from the very beginning. For instance, he makes reference to infants' appreciation of global aspects of the face, including their preference for animation (Sherrod, 1981); their fluid facial-scanning pattern compared to geometrical objects (Donee, 1973); and their animated bodily movements and vocalizations when looking at live faces (Brazelton et al. 1974). Judging from Stern's characterizations, it seems to be a difficult task to decide whether the human face is perceived as a unique form or "no different from other objects that move" (Stern, 1985,

p.63). Hence, our mission is to approach this question from a phenomenological perspective as well as a re-reading of some relevant experimental findings.

Although infants, to a certain extent, lack the experience of their own visibility, they unequivocally expect and actively seek out human forms in the world. Whereas infants do not have visual access to their own face and are largely unaware of their visibility, they are always attuned to the facial features and gestalts in their lived-world. For example, research shows that infants prefer circular patterns such as the image of a bull's eye, over a different pattern composed of straight lines with comparable amount of contrast such as a checkerboard (Fantz, 1964; Fantz and Fagan, 1975). In a study on visual scanning, it was found that newborns would systematically scan the edges of an outlined figure, associated with maximum neuronal activities in their visual cortex (Haith, 1980). Furthermore, it seems that infants' attunement and preference for visual stimulus resembling facial features continue to develop over time. Haith et al. (1977) note that between five to seven weeks, infants spend a dramatically increased time looking at an adult's face. By the second month, infants begin to demonstrate a strong attunement to the eyes of an animated face.

In addition, infants would imitate an inanimate object performing movements resembling facial gestures, such as the protrusion of a pencil. This phenomenon brings up the concept of physiognomic perception, which is the tendency to perceive inanimate objects or nonhuman living things in terms of human physiognomies, facial expressions, gestures, or more generally, acts of human beings (Werner, 1956). Infants demonstrate a strong preference for and attunement to face-like features in both animate and inanimate objects. Thus, in a way, they seem to perceive the inanimate as the animate. The world

is full of life, as Werner (1957) suggested, because infants' perception is fused with an innate sense of sociality. For infants and young children, inanimate objects are perceived as "directly expressing an inner form of life" (p.69).

Nonetheless, infants' perception of the human face is not indiscriminatory or neutral for there is a strong preference for the mother's face. In one study (Walton et al, 1992), infants less than two days old were exposed to the image of their mother's face and that of a female stranger, presented side by side. The image of the female stranger matched the overall features of their mothers such as hair color and skin tone. Nevertheless, the infants were found to look significantly more at the image of their mother. In addition, it was shown that newborns would suck more frequently in order to watch a video screen showing their mother's face rather than a stranger's face.

The human face is far more than a simple visual object in the world. A face is not only dynamic with motions, but also represents the emblem of infants' social existence. For instance, infants can detect anything that is "off" about a face. In one experiment (Morton & Johnson, 1991), newborns' visual tracking patterns were recorded as they were watching two-dimensional schematic face-like displays moving on a screen. The researchers found that they looked significantly more at the face-like displays when eyes, eyebrows, nose, and mouth were presented in a natural way (i.e. resembling a human face), as opposed to a blank or "scrambled" displays.

For a face to look "right" in the eyes of infants, it also has to correspond to other sensory components that make up the totality of a person. In particular, Haith (1980) notes that babies by six weeks begin to attend more closely to the faces that speak. Infants also expect a temporal correspondence between the auditory and visual

presentations (i.e., lip movements). In two collaborative experiments, it was found that infants would look longer at the presentation in which the articulatory movements of the mouth corresponded to the actual sound they heard (MacKain et al, 1982; Kuhl & Meltzoff, 1982). Hence, infants are evidently attuned to the “right” face. Nonetheless, there seems to be a primacy of the human face as seen over the associated sensory qualities of a speaking face. For example, when articulatory movements are inconsistent with the sound produced, people generally experience the sound that is supposed to correspond to the lip movements (McGurk & MacDonald, 1976). As Stern (1985) suggests, people hear what they see while looking at a speaking face.

Interestingly, infants continue to develop more subtle expectations about the human face. The researchers in one experiment attempted to systematically observe a group of three to sixth month old infants interacting with an adult (Hains & Muir, 1996). In one condition, the adult fixated her eyes on the infants through a direct gaze; in the other condition, she averted her gaze 20 degrees off center. It was found that the infants smiled significantly less in the averted-gaze condition, despite the head position of the adult remained the same. Furthermore, the infants of three-month-old or younger showed a significant decrease in smiling when the adult turned the head sideways while maintaining eye contact. Nonetheless, this appears to change by five months of age, as infants’ sensitivity to eye contact no longer depends on the head orientation of social partners (Caron et al., 1997). In yet another study, it was shown that infants as young as three months old have developed an awareness of the referential gaze, as they would orient their gaze and look in the same direction as the adult’s gaze (D’Entremont et al., 1997).

Our reexamination of the experimental records cited in this section supports the general conclusion that infants are born with a global awareness of other co-existing human beings. They demonstrate behaviors that presuppose an awareness of the existence of other human beings, perceived as unique forms or gestalts rather than the merging of isolated sensory qualities. Newborns also respond favorably to what might be called the “human stimulus”: movements, motion, face, voice, tactile stimulation, social behaviors, and so forth. Furthermore, they evidence a precise precognitive understanding of the configurations of the human face, and of the visual-spatial correspondence of an articulating face.

These findings demand an ontological explication. Specifically, the nature of social consciousness is in question. If consciousness refers to a state of existing as an independent self that goes through a developmental process of social learning, other human beings are inevitably reduced to objects within a mind/psyche; the others are “for-me,” so to speak. Hence, other human beings will always hold a secondary ontological status in the language of self-consciousness: I exist first and foremost as a consciousness with a core awareness of my own existence, and other human beings are simply objects that I prefer a little more than inanimate objects. Accordingly, the fact that they also possess conscious minds is something that I can only discover later based on some cognitive/mental leaps.

Alternatively, if consciousness is conceived in terms of “*compresence*” or co-existence, the state of being present or coexisting with others, then all of things that I know and learn about other human beings can be viewed as already pregnant in such co-existentiality. The notion of *compresence* (Ortega y Gasset, 1957) suggests that the

perception of self is coextensive with the perception of others; it also indicates that my conscious existence involves my participation in the existence of other human beings, suggesting an alternative ontology of intersubjectivity. As Simms (2001) suggests, "we begin life not as separate monads, but as mingling presences, as aspects of significant wholes where the newborn's action finds its complement and completion in the actions of the other" (p. 27).

Thus, the unique human face as seen by infants is not simply a perceived object. Whereas infants are not reflectively aware of a separate intentional human being in sight, they are nonetheless participating in the expression of human intentionality upon seeing a face. This participation is not based on any innate mental ideas or representations, but rather on their embodied engagement in a common world with other embodied beings. Hence, their innate awareness of human forms is always coupled with their bodies: what they see as human is always coupled with what they feel in their own human bodies. This idea of infants' social existence is fundamental to our investigation in the following section, in which we will reexamine the phenomenon of imitation and reflect more deeply on infants' face-to-face encounter with an adult partner.

4.3 Neonatal Imitation: Facial and Emotional Dimensions

Many researchers view infants' encounter with a social partner from the perspective of mental representations and organizations. From a phenomenological perspective, when infants meet the human face in all its variations—facial expressions, tones of voice, and so forth—there is something far more fundamental happening.

The infant's embodied awareness of her own face immediately becomes an apparatus to produce a variety of facial gestures. Similarly, the facial gestures on a social

partner, as seen from the infant's point of view, are immediately capable of expressing the same intentions; she knows it not by means of a cognitive approximation or an analogy, but through what scientists called a cross-modal transfer between vision and proprioception. According to Merleau-Ponty (1986), when an infant sees the mother slowly widening her mouth to display a surprise expression, this facial gesture has immediately, for the infant, an intersubjective significance. This description of neonatal imitation has tremendous ontological implications for human existence. In the following, we will attempt to explore some of these implications through a deeper examination of the phenomenon of imitation in both facial and emotional/affective dimensions.

Facial Imitations in Newborns

In general, developmental psychologists are primarily concerned with the functional role of imitation in an infant's development. Nonetheless, it is also important to approach neonatal imitation as a phenomenon that might further reveal the primordial social nature of an infant's existence. Let us consider the following findings from infant research. Meltzoff (1990) found that infants as young as forty-two-minutes-old can imitate the facial gestures of an adult model, such as tongue protrusion and lip pursing. They can also reproduce head and finger movements modeled by an experimenter (Meltzoff & Moore, 1977). Furthermore, a different study reported that newborns are capable of reproducing well-contrasted facial expressions of happiness, sadness, and surprise modeled by adults (Field et al., 1982). Apparently, these findings contradict with the long-believed necessity of visual schemas in facial imitation, mostly from the perspective of cognitive psychology.

Experimental observations on neonatal imitation have spawned a variety of

interpretations. For some, it is a transient phenomenon that is based on an automatic release mechanism of the human body (e.g., Anisfeld, 1991). Nevertheless, the more popular opinion is that it involves an active cross-modal matching between vision and proprioception. Beebe and Lachman (2002) refer this “matching” ability as the mechanism that constitutes a fundamental relatedness between self and other.

Lichtenberg (1983) conceives imitation in terms of a social responsiveness that requires an “innate patterning.” The implication is that both the mother and the newborn are primed to engage in social interactions, instead of acting as “two individuals sending discrete messages.” In order for infants to execute imitative facial movements, they must “identify the thing they see protruding from the adult’s mouth as the same thing they can feel (but not see) in their own mouths,” following by “fairly complex muscular movements to complete the imitation” (p.18). From this perspective, infants are “preprogrammed to respond to a visual stimulus in a manner that produces a mirror-image response—the infant’s face taking on the physiognomic appearance the infant sees” (p.105). Thus, imitation is a primordial kind of “emotional mirroring” understood in terms of a “communication system of incredible synchronous immediacy” (p.106).

Stern (1985) describes imitation as an example of amodal perception, which is prior to the differentiation of distinct sensory modalities. In their discussion of infantile imitation, Maurer and Maurer (1988) argue that synesthesia or the unity of senses should also be taken into consideration. They suggest that imitation is not only a cross-modal mechanism, but also reveals an integrated perceptual world of infants. Accordingly, facial movements as seen are no different from facial movements as felt in the infants’ own facial muscles.

Our investigation of neonatal imitation will begin with a phenomenological reflection on an infant's embodied situation. In the newborn's world, the neonate experiences her body in a very different way than she experiences other bodies. This difference does not lie in the bifurcation between two isolated conscious subjects, but in the very embodied situation of human beings—that is, we are always on the same side of our body. The infant, being on the same side of her own body, has no access to an integrated image of herself as a visible body with a visible face. Furthermore, there are parts of her body that she would never see without a mirror. To sum up, the embodied infant simply does not have the vantage point to visualize her body in the exact way she sees other human bodies.

Without a visual image of her own, the infant's imitation cannot be based on a point-for-point correspondence between her corporeal schema and the adult's facial configurations. Otherwise, it would be impossible to conceive why infants would also imitate the gesture or motion from a nonhuman stimulus. Hence, regardless of the kinds of visual stimulus that invigorates imitative gestures on the infant's face, this phenomenon reveals a more global notion of social perception during early infancy.

The infant engages in the world with her lived-body, which is not merely a biological object or a mass of sensations that defines the state of an individual consciousness. One way to think about the lived-body is through the notion of corporeal or "postural schema," which is the awareness of "the body's position in relation to the vertical, horizontal, and certain other axes of important coordinates of its environment" (Merleau-Ponty, 1964, p.117). From a phenomenological point of view, it is also important to capture the immediacy of embodied, intersubjective encounter between

human beings. Thus, Merleau-Ponty (1964) comes up with the idea of the transfer of corporeal schema.

The corporeal schema is fundamentally transferable across human beings. To clarify, we do not each possess a corporeal schema that is bounded inside our physical body. Recall that the lived-body is inherently open outward to the world. The notion of a corporeal schema further accentuates this openness; the body (and corporeal schema) is open toward a shared world inhabited by other visible bodies (and corporeal schemas). In other words, the notion of corporeal schema already presupposes its transferability—to possess a corporeal schema is to thrive in its transferability. For an infant, this transfer is understood as an immediate perceptual linkage through which she recognizes other human beings as like unto herself.

How does the idea of the transfer of corporeal schema apply to a phenomenological, nondualistic explanation for neonatal imitation? When an infant sees the facial movements of an adult partner, she feels them in her own face as well. Seeing the gestures on an adult's face, for the infant, is not merely a visual perception. Rather, it is immediately a "postural impregnation" (Merleau-Ponty, 1964, p.145), an automatic mobilization of her own postural or behavioral capacities that approximate the expressions of the seen person with astounding precision.

According to Merleau-Ponty (1962, 1964, 1968), we do not simply possess a body that carries out physiological and biological functions. The lived-body also grants us "postural" functions, one of which is the power of assuming others' facial and behavioral expressions as one's own—the transfer of corporeal schema. Thus, neonatal imitation reveals the infant's discovery of the human "flesh" that she and her partners are,

and thus, of the commonality they all share. Through the infant's own imitative facial gestures, their identification as "flesh" is confirmed.

Is Facial Imitation also Emotional Imitation?

Rochat (2001) proposes that infants might not merely be imitating facial gestures, but also reproducing the affect and emotion of the person. This idea is supported by an abundance of empirical evidence (e.g., Elkman et al., 1983) that suggest facial gestures are not simply an outward expression of inner feelings, but they actually precede and "cause" particular feelings. According to this idea, facial imitation allows infants to "experience vicariously the feelings of others" (Rochat, 2001, p.145). When infants reproduce the facial gestures of an adult, they are not only feeling what it is like to exercise their facial muscles in a particular pattern, but also experiencing the associated emotions. When infants match an adult's facial expression through imitation, they are creating in their body a "psycho-physiological state similar to that of the partner, thus participating in the subjective state of the other" (Beebe & Lachman, 1988a, b).

Further supporting evidence of emotional imitation can be found in a study on affective resonance. Note that by the age of ten months, the brain is lateralized for positive and negative affects. Davidson and Fox (1982) conducted an experiment in which the infants were shown video records of a happy-laughing actress and a distressed-crying actress. As expected, when the infants saw a videotape of a smiling-laughing actress, their EEG activation patterns indicates positive affect; when exposed to a distressed-crying actress, their EEG activations shows negative affect. Even without the explicit imitation of facial expressions, "the mere perception of emotion in the partner creates a resonant state in the perceiver...[and] what an infant perceived on the face of

the partner altered his internal state, and the infant could not escape the face of the partner” (Beebe & Lachman, 2002, p.37).

To expand on the ontological significance of emotional imitation and resonance, we should begin with a revised notion of the body in the intersubjective context. As discussed before, Merleau-Ponty (1962) speaks of the body as a sort of generality, granted with “the power of adopting certain forms of behavior and a certain world...as a certain hold upon the world” (p.412). The experiment carried out by Davidson and Fox (1982) seems to support this idea. Based on the the EEG activation patterns observed in their study, it can be inferred that infants do not actually constitute others as unrelated, alien objects. Rather, infants’ perception of the emotional gestures of other human beings immediately generates in their own body an approximation of the same affective responses.

Furthermore, there is clearly a physiologically-based emotional resonance associated with the transfer of corporeal schema, which, in light of the current evidence, is not just a behavioral or gestural transfer by means of a visual-proprioceptive correspondence. The phenomenon of emotional imitation and resonance exposes a sort of anonymity or generality of the infant’s body, whose innate power is to live in it the “conducts” the infant sees on other embodied beings. According to Merleau-Ponty (1962), conduct refers to the manner in which we as human beings deal with the world—our ways of grasping the world, so to speak. One such way is through our facial expressions or gesturing. The research studies cited in this section demonstrate that infants can “live” the facial expressions they see on a person, revealing the generality of the body that Merleau-Ponty speaks of. Accordingly, the notion of the body’s anonymity

or generality effectively deconstructs the “natural attitude” that the body is either under the control of a mind, or equivalent to the self.

Implications for Infants’ Sociality and Selfhood

The current account for neonatal imitation and emotional resonance, based on the notion of the transfer of corporeal schema, offers an ontological foundation for infant’s development of selfhood and sociality. Beyond neonatal imitation, it is worthwhile to note that witnessing an adult matching his own facial expressions, often with a slight exaggeration as many researchers have observed, is also a major part of infant’s interactive experience.

In this primordial world of social exchanges, we can already find traces of what might become core features of an adult’s conscious existence. On the one hand, for example, the infant sees a sad facial gesture on the other person, imitates it with her own face, and feels the associated sadness in her own body. This process allows the infant to learn not only what a sad person looks like, but also what it feels like to experience the sad feelings and facial gestures in her body.

On the other hand, when the infant feels sad for some reason and simultaneously expresses the sadness on her face, she is often responded to by a proximal caregiver who would match her sad facial expression with a slight exaggeration. This, in turn, is shown on the caregiver’s own face and becomes visually accessible for her. This circular process not only allows the infant to experience affect attunement, but also validates and refines the ways in which her facial muscles are exercised in such specific and intricate patterns while feeling sad. Thus, it would be logical to infer that these primordial interactions based on facial imitation/matching might be the foundation of an ongoing,

interaction-based process of facial configurations. The infant will continue to develop a repertoire of facial expressions similar to those of the adults' in her surrounding, thus beginning to demonstrate a social presence increasingly similar to that of an adult. This also seems to explain why blind infants would lose their "social smile" by the middle of their first year without compensatory tactile stimulations provided by caregivers (Fraiberg, 1977). Fraiberg's research shows that emotional gestures such as smiling are not just facial features, but a complete bodily event situated in a social world.

In addition, the tight connection between the infant's proprioception of her own facial movements and her visual perception of others' facial movements (and their associated emotions) is deeply sedimented in her social experience. This can be viewed as the developmental foundation of the infant's increasingly reflective and thematic existence. The sedimentation of vision-proprioception-emotion explains why most infants do not seem to be frightened when they first discover their own specular/mirror image (Lichtenberg, 1983). The infant's own mirror image, in a sense, is already implicit in her earliest social reality, which involves primarily with imitative facial exchanges and matching. Thus, these primordial social exchanges can be considered as the building blocks of the integration between her specular/mirror image and bodily intentionality, which would forever transform the infant's conscious existence into an awareness of herself as a visible body among others.

Lichtenberg (1983) also suggests that neonatal imitation is fundamental to why the mirror conveys information about the toddler's self: "The infant seems to be preprogrammed to respond to a visual stimulus in a manner that produces a mirror-image response—the infant's face taking on the physiognomic appearance the infant sees"

(p.105). As evidenced in infants' imitative behaviors, we can see that for them "the other body has ceased to be mere fragment of the world, and become the theater of a certain process of elaboration, and, as it were, a certain 'view' of the world" (Merleau-Ponty, 1962, p.412).

Experiments on neonatal imitation and emotional resonance attest to the infant's primordial intersubjective world, which is founded upon the transfer of corporeal schema or intercorporeality. Accordingly, this intersubjective ontology effectively deconstructs the body as a unified identity of the self; the infant's body is no longer conceived as the physical agent carrying out actions commanded by an overseeing mental entity. Also, the infant's perception of others is no longer understood as a pure perceptual or cognitive event. Merleau-Ponty (1962) argues that "if another's body is not an object for me, nor mine an object for him, if both are manifestations of behavior, the positing of the other does not reduce me to the status of an object in his field, nor does my perception of other reduce him to the status of an object in mine" (p.411). This means that as embodied beings our intentions play across each other's body (the transfer of corporeal schema), and this fundamental "co-existence" transcends the self-other and the subject-object thematizations.

Through our reflection on the phenomenon of neonatal imitation, we believe that the so-called self and others are given in the infant's perception as an integrated system; the newborn "perceives its intentions in its body, and my body with its own, and thereby my intentions in its own body" (p.410). In a sense, the infant lives both her intentions and my intentions in her visible body, as demonstrated in both facial and emotional imitations. Thus, the infant also participates as the "other" in the system of her social

partner, for her body pre-reflectively adopts and expresses the intentions of others as Merleau-Ponty suggested. Thus, the body itself cannot be identified as the equivalent of a self or the subject.

4.4 Perceiving Intentionality¹⁹

In this section, we will look at a couple of experiments and use their findings to reflect on infants' perception of intentionality in an intersubjective world. In particular, there are two specific issues to be addressed. First, how do infants experience intentionality in their social existence, without a reflective and articulated understanding of other "minds"? Second, how do infants perceive the subject-object role distinctions that are often considered as the basis of social intentionality or causality?

These questions are rooted in an intriguing issue in the history of developmental psychology, often posed under the heading of "theories of mind": when and how do infants begin to perceive other persons as intentional beings? The general consensus is that children do not develop the ability to "construe others as having states of mind, beliefs, desires, and complex reasons for behaving one way or another" until at least between the age of three to four (Rochat, 2001, p.163). However, not everyone believes in such a clear-cut developmental trajectory, as some psychologists argue that "prior to the well-documented emergence of theories of mind in the verbal child, infants develop sophisticated, although implicit (not yet verbalized) understanding of others as intentional—having desires, feelings, and fluctuating affects" (p.164).

From a phenomenological perspective, our access to others' minds is only a

¹⁹ Here, "intentionality" is being discussed as a topic of study within infant research (e.g., Rochat, 2001). More specifically, this section is dedicated to investigate the question of how infants can access and experience other "intentional" minds.

problem under the dualistic framework, in which we all are construed as self-contained consciousness subjects, isolated core entities, or demarcated experiential territories. In our research on this subject matter, we have found that there is a major confusion in the literature between the absence of cognitive abilities to represent, reason, reflect, and infer the intentional or mental features of other people; and the absence of intentional beings in infant's social existence.

Let us take a step backward and entertain the following questions. If infants do not perceive others as intentional beings, what do they perceive other human beings as? Prior to the achievement of some "theories of mind," explicit or implicit, do infants simply perceive other human beings as "mindless" objects with bodies that move? The transfer of corporeal schema, as the foundation of intersubjectivity, renders such a hypothesis impossible because it suggests that infant's social awareness is founded on a state of coexistence with other similar embodied beings in a shared world. Accordingly, the problem of "how" to access other minds is no longer the same problem under the ontology of intersubjectivity or intercorporeality.

From an experimental point of view, it is a challenging task for researchers to directly study infant's perception of social intentionality in experimental settings. Thus, many experiments are actually designed to provide some indirect empirical observations through which researchers can make grounded inferences about infants' perception of the basic aspects of intentionality, such as social causality and the subject-object roles.

Perceiving Intentions/Social Causality

In a research experiment on infants' perception of social intentionality (Rochat et.al., 1997), three groups of subjects (i.e., three-month-olds, six-month-olds, and

“control” adults) were exposed to two dynamic displays on two computer screens placed side by side. Each display showed a pair of colored displays either independently (independent display) or in systematic interaction with one another (chase display). In the chase display, the “chaser” disc systematically approached the “chasee” disc at a constant velocity; the latter automatically accelerated away from it whenever they came close. In the independent display, the movements of both discs were random. The findings of this experiment were threefold: first, three month olds looked significantly more at the chase display; second, adults and sixth month olds looked significantly longer at the independent display; third, post-test interviews of the adults indicated they were attempting to pick up “invariant dynamic patterns” by looking longer at the independent display, which was very obvious in the chase display.

This study has been interpreted as the early traces of adults’ inclination to attribute physical and social causality to dynamic displays of geometrical figures: one object is “causing” the other object by dragging along with it or launching at it; or, one object is chasing after the other object with the intention of “catching” it. The researchers suggested that infants from as young as three months of age already show “a sensitivity to movement information that specifies sociality causality for adults” and “this sensitivity is expressed differently and appears to develop between three to sixth months of age” (Rochat, 2002, p.154).

The first finding shows that the three-month-olds were looking longer at the “chase display.” What made the infants pay more attention to the “chase display” than the “independent display”? What was the basis of this “preferential looking”? Based on this finding alone, it can only be concluded that young infants are more sensitive to

relational movements between two inanimate objects. However, if we follow the logic of physiognomic perception—the tendency to “perceive the inanimate as the animate,” it is a legitimate assumption that the infants perceived the relational, patterned movements between two inanimate discs as an expression of social intentionality—that is, an intentional bond between them.

The second finding suggests that there was a change in the sixth-month-old infants’ approach in the same experimental situation. Whereas the younger infants seemed to immediately identify with the “chase display” that provokes a sense of an intentional bond between two objects, the older infants paid more attention to the “independent display” for some reasons. At the most fundamental level, this could be attributed to an epistemological change in which infants progressively become more interested in “figuring out” an event that does not immediately offer a meaning. This change is consistent with other empirical evidence suggesting a similar developmental trajectory—for instance, from being more people-oriented (i.e. an immediate engagement in social interactions) to object-oriented (i.e. an increasingly exploratory stance toward the world of objects).

In the post-test interviews, the adult participants claimed that they were looking longer at the independent display in attempt to “figure out” these movements. Hence, it can be logically inferred that the sixth-month-old infants were expecting the random movements of the discs in the “independent display” to be somehow “in-relation” to one another. Like the adults, they might have been looking longer at the independent display in attempt to figuring out a visual display that did not immediately offer an intentional

bond or relationship between the two discs.²⁰

Putting all the findings together, the three-month-old infants looked longer at the “chase display” because the movement patterns immediately offered a sense of social intentionality, and the sixth-month-old infants looked longer at the “independent display” because the random movements did not provide the intentional bond that they expected to perceive. Whereas the experimental outcomes in this study allow us to conclude that infants seem to perceive movements between two inanimate objects in terms of their sociality (either through an immediate identification or a sense-making effort), it does not provide enough clues about the nature of their sense of social intentionality. Thus, the tension between the dualistic and nondualistic perspectives on the infant’s sociality cannot be resolved based on this study alone.

From a dualistic point of view, the infant’s sense of social intentionality is defined by two isolated objects imposing their intentions on one another, and causing one another to behave in certain ways; hence, the sixth-month-olds seemed to be trying to “figure out” these “causal” relationships from the independent display. According to this standpoint, the infants “embellish their interpretations of how one entity moves in relation to the other with physical or social causality, and even to attribute intentions and dispositional qualities to these figures” (Rochat, 2001, p.153).

From a nondualistic perspective, in contrast, the experimental outcomes can be just as easily be interpreted as indicating a more global sense of social intentionality, which would suggest that it was the relational movements between the two discs that

²⁰ Accordingly, the effect of novelty can no longer be treated as the evidence of infant’s ability to discriminate one thing from another, or mentally represent these entities in their heads. The so-called preference for novelty might simply refer to infants’ epistemological approach to figure out or make sense of the unfamiliar.

provoked in the infants a sense of the intentional bound between the two discs. After all, we do not know if the infants perceived that one object was actively pursuing the other object and causing it to move further away, or the stillness of one object was inducing the other object to approach it.²¹ Given the cause-and-effect relationship and the subject-object role assignment were unclear in this case, it cannot be said that the infants were simply “interpreting” these movements by means of physical and social causalities, or “attributing” them to intentional and dispositional qualities that characterize adults’ social interactions. In order to further substantiate this claim, we will look at a different but related research study.

Perceiving Subject-Object Roles

If the young infants do perceive a more global sense of social intentionality, which precedes and grounds the clear distinctions between the subject-object roles in social interaction, it is expected that infants would not notice the events when these roles are reversed. Rochat et al. (2004) carried out another experiment that seems to support this idea. In this research study, the infants from different age groups were habituated to two identical discs, different only by color (blue & red), chasing one another on a computer display. Then, they were either exposed to the same event or a role-reversal event in which the chaser became the chasee by a color switch of the discs. The researchers were particularly interested in the infants’ response to the role-reversal event. It was found that infants younger than seven months old showed no signs of dishabituation during the role-reversal trial, indicating that they did not notice the fact that the roles of the discs were reversed. They found that, however, dishabituation

²¹ As shown in the “still-face” experiment discussed before, “stillness” can certainly be the call that induces actions in the social dimension.

became evident for seven-month-olds and increased dramatically by nine months.

The outcomes of this study provide empirical clues for how social intentionality might be expressed in infant's lived-world. In the experiment, the blue disc chasing the red disc and the red disc chasing the blue disc were two distinct events (from an adult's point of view) that represent two different subject-object relationships; each event had a clear assignment of the subject-object roles. Because the young infants did not notice a "role-reversal" event, as shown in this experiment, it would be logical to infer that what is construed as two different events for adults are essentially identical in the world of infants; at least, not until at a later age as suggested by the researchers. It seems that they did perceive a more global sense of social intentionality, based on the dynamic, supposedly-relational movements of the two discs. The ontological implication is that young infants experience a world in which objects are not marked with fixed subject-object roles, and it is only in the full relational or intersubjective contexts that social intentionality is perceived and experienced.

From a phenomenological perspective, relational movements between two objects are already pregnant with an intersubjective significance, a global social intentionality. In other words, infants immediately perceive object movements as capable of carrying out the same social intentionality they experience with other human beings. Borrowing Merleau-Ponty's characterization (1968), the subject-object relation in the infant's world is reversible in perception, and this reversibility seems to be a fundamental aspect of infant's social existence.

How do we explain that the older infants seemed to notice the role-reversal event then? The timeline of this change is strikingly similar to the epistemological change that

took place in the previous research study. Infants' developing tendency to seek meanings in novel events might be related to their increasing attunement to the nuances of social exchanges. For instance, Rochat (2001) discusses a number of research studies suggesting that infants between two to six months "develop an ability to consider the behavior of people beyond the here and now by relating current behavior to past interaction" (p.151). Whereas two or three-month-old infants seem to be completely involved in a world of reciprocal social exchanges, older infants begin to develop some kinds of expectations specific to their interaction with a certain partner. This capacity allows the relationship-seeking infants to perceive social transactions in an increasingly (not completely) thematized manner. Thus, the older infants in this experiment could notice when the object that was chasing another object suddenly became the one being chased. Their increased attunement to the transactions of social interaction might explain why their strategies in eliciting and coping with certain social responses seem to become more patterned and partner-specific over time (e.g., Tronick et al., 1978).

The two experiments cited in this section show that infants directly perceive a more global social intentionality, which precedes and grounds their developing awareness of individual intentionality and subject-object role distinctions. Hence, it seems that infants do perceive other human beings as intentional in a pre-reflective and embodied manner, prior to the achievement of explicit "theories of mind" much later in their development. The young infants' identification with the display that indicates an intentional relationship, as well as their indifference to the role-reversal event that specifies a particular intentional bond between two objects, suggest that they do perceive a more global sense of social intentionality. The reversibility between subject-object

roles is founded on the infants' intersubjective world, in which these roles are not fixed, determinate, and thematized. Nevertheless, they gradually transition from being completely involved in these immediate social exchanges, to becoming increasingly sensitive to the social nuances that specify the subject-object roles of an intentional bond between two moving objects.

4.5 Infants' ability to distinguish between the self and others

In this section, a research study (Martin & Clark, 1982) will be thoroughly analyzed from a phenomenological perspective guided by a very specific ontological question—that is, whether or not the self and others are originally separated in infant's social existence. In psychology, this issue traditionally takes on a dichotomous theme: an undifferentiated self-other confusion versus an absolute demarcation between two isolated subjects. The tension between these perspectives is easily observable in infant psychology. For instance, it has been noted that the developmentalist D. Stern also struggled to find a “middle ground between psychoanalytic concept of the symbiotic, undifferentiated relationship of self and other, and the cognitive concept of two distant unrelated observers” (Simms, 1993, p.38).

In our review of the literature, the cognitive perspective tends to generalize the opposing views into an extreme version of “symbiotic oneness,” a classic term made known by Margaret Mahler in psychoanalysis.²² Accordingly, it is a rather simple task for the researchers to overturn these “undifferentiated” views, insofar as it is shown that infants are not confused between their bodies and other human bodies. In fact, there is

²² Many “undifferentiated” views are automatically discounted because they are considered as remnants of the notion of “symbiotic oneness” by mainstream psychologists

plenty of empirical evidence suggesting that infants are not confused. However, does such evidence support an ontological separation and distinction between the self and others? Most infant researchers seem to believe that, and their underlying rationale is not difficult to articulate: if research shows that infants are not “confused” and do “react differentially” to what belongs to them and what belongs to others (such as voice, touch, or movement), it would support a dichotomous self-other perspective of the infant’s social existence.

This ontological inference is a huge leap of faith. In general, there is often an unspoken tension between ontology and theory in the work of infant researchers who attempt to take on the self-other problem in their writings. Dichotomous terms such as differentiation and undifferentiation, fusion and separation, distinction and confusion, are frequently used by infant scholars. However, their ontological implications associated with these terms do not always get enough attention. An adequate ontological approach to the self-other problem requires a clear conception of these two terms, “self” and “others,” as well as a cogent articulation of their relatedness or separateness. There are numerous ways in which these two terms have been implicitly taken up by psychologists, often determined by how an individual is defined or characterized: isolated conscious subjects, biological entities, or experiential domains (e.g., D. Stern’s senses of self).

At this point, we have already established an ontological description of intersubjectivity that subtends both the self and others, as well as the notion of corporeal schema that describes their transferability or relatedness. Now, the challenge is to reexamine whether or not the infant’s so-called “ability to distinguish” indicates a self-other ontological dichotomy, and necessarily precludes a more-or-less undifferentiated or

syncretic view of intersubjective ontology. In addition, we need to show that the intersubjective ontology, often associated with descriptions such as “undifferentiation” and “fusion,” can survive the empirical evidence suggesting that infants can “distinguish” and “discriminate” between the self and others.

Evidently, infants do not respond to every living thing in the world in the exact same way, and there is no exception to their social and interactive behaviors. Newborns are born with preferences that are highly adaptive from a biological/evolutionary perspective. They can distinguish their mother’s voice, which they prefer to a stranger’s voice (DeCasper & Fifer , 1980). They also prefer their mother’s smell and face to those of a stranger (MacFarlane, 1975; Field et al, 1982). Do these early “preferences” suggest a distinct sense of other that is essentially separated from a sense of self? Apparently, they have been interpreted as such (e.g., Stern, 1986; Rochat, 2001; Beebe & Lachman, 2002). These preferences have been considered as supporting a dichotomous self-other ontology: a distinctly differentiated sense of self acting discriminately toward the features of other isolated human beings out there. Nevertheless, such an “ontological leap” is prone to be challenged by critical thoughts because the same rationale can be easily applied to an intersubjective ontology: these preferences can be viewed as the experiential quality of togetherness with a specific other, or a distinct state of togetherness and coexistence, which does not necessarily presuppose a self-consciousness or a distinct identity of the self.

What about the research that demonstrates infant’s ability to discriminate other people from herself? Is this kind of research evidence of the shatterproof indication of an ontological distinction between the self and others? There is in fact a sound logic to this

line of thinking, which permeates the infant literature. For the sole purpose of the current investigation, we have identified it as the thesis of a “discriminatory consciousness.” According to this thesis, if an infant behaves differentially to her own voice than to her mother’s voice, she is thus able to know and discriminate between what is the self and what are the others. As a result, it would presuppose an ontological demarcation between the self and others. This thesis offers a view of consciousness or the mind that is preoccupied with a mental project of discriminating and distinguishing between a sense of self and a sense of others. This perspective has led a handful of researchers to envision infants as cognitive agents who are actively grouping the “self-invariants” and “others-invariants” into separate mental categories or schemas (Stern, 1996).

Without a doubt, the thesis of discriminatory consciousness requires a serious investigation. In the following, we will reexamine a major supporting experiment that has led many researchers to conclude that infants possess an “auditory self” (Butterworth, 1990). This study has been widely cited as the evidence of a distinct sense of self that is already operative in early infancy. We will explore alternative interpretations that might contradict the dualistic ontology of self-other differentiation.

Martin and Clark (1982) show that neonates are able to distinguish their own vocalizations from those of other neonates. In their experiment, there are two groups of infant subjects, each exposed to two experimental conditions: a calm baby listening to its own crying voice on a tape and that of another infant, and a crying baby listening to its own crying voice on a tape and that of another infant. The results indicate that a calm baby vocalizes less when hearing its own crying, and vocalizes more when hearing the cry of another infant; and the crying baby cries less when it hears its own cry, and more

when it hears the cry of another.

From a dualistic perspective following the line of reasoning as discussed before, these findings are broadly taken to indicate the literal existence of an “auditory self.” The rationale of this interpretation is based on the simple fact that the baby responds differently to the auditory presentation of her own crying and that of another infant, which is attributed to her ability to “discriminate” between what belongs to her and what belongs to others. The infant has a core sense of self with a rigid boundary, existing as an isolated subject among other human beings. And this fundamental sense of an “auditory self” is what guides the infant to discriminate between her own crying and another infant’s crying.

A Nondualistic Reinterpretation of Experimental Outcomes

Before attempting to reinterpret the observations in this research study, it is important to ponder the meanings of vocalization (and its frequency) for an infant in a relatively calm and alert state, and of crying (and its intensity) for an infant in a relatively distressed and dissatisfied state. To this end, we believe that frequent vocalization indicates interest, pleasure, and excitement, and frequent crying suggests displeasure, unattended needs, and more distress. From a phenomenological perspective, vocalizing with interest and excitement is no different than living in a calm and interesting world, and crying in distress is also no different than living in a distressed world.

According to Merleau-Ponty (1964), infants live in a syncretic social reality in which there is a relative lack of self-other differentiation: “there is not one individual over against another but rather an anonymous collectivity, an undifferentiated group life” (p. 119). The phenomenal world of infants is experienced as one global perspective;

when they interact with a social partner, they are not aware of the back-and-forth transactions between two individual perspectives. Rather, infants only experience the affective flow of the social exchanges. For instance, when a distressed infant is crying intensely, she might be aware of the sensations from the touch and the voice of her mother, but not the mother's intention to calm her down as a different perspective, so to speak. If the mother's comforting attempt fails, the infant's world remains to be a distressed world. If it succeeds, the infant's world gradually becomes a calmer world.

This idea is not the same as the psychoanalytic notion of symbiotic oneness which is envisioned by mainstream psychologists as a sort of merged entity, like "some huge animal whose organs our bodies would be, as for each of our bodies, our hands, our eyes are the organs" (1968, p.142). The lack of differentiation is not to be taken literally. Instead, it refers to a lack of reflective differentiation between the self and others as isolated and separate intentional being. The point taken is that infants do not experience themselves as isolated selves with a distinct identity. The infant's body is not the equivalent of an individualistic self because it does not entirely coincide with her own intentions. Neonatal imitation and crying contagion are great examples of how the infant's body might act on the intentions of others.

This is because infants experience the world holistically: how they feel and how the world shows up correspond to each other. During interactions, infants do not have the awareness of two distinct identities or isolated conscious subjects. In the case of emotional contagion, the infant does not first reflectively identify that it is the cry of another infant, interpret it as a signal of distress, and then begin to shed tears as an empathic response. Instead, if the infant begins to cry when listening to the cry of

another baby, it means that the associated distressed signals have become the global perspective of her lived-world. The infant starts to cry in what is immediately perceived as a distressed world; she does not perceive the distressed infant who makes her cry, so to speak.

To sum up, if we do not begin our interpretation with the self and others as two separate terms, then what might be considered as the infant's "ability to distinguish" is no longer the uncontested evidence of a core self and a core others. Instead, the nondualistic descriptions of the "auditory self" research study (Martin & Clark, 1982) can be reinterpreted in the following manner.

Reflecting on the Experience of the Calm and Engaging Infants

In half of the experimental conditions, the infants began in a calm and alert state in which they were attentive and interested in their surroundings. For one group of these infants, it was a calming and somewhat interesting world as evidenced by their vocalizations until the cry of another infant was introduced. This new crying voice was somewhat realistic, because hearing the cry of another infant is not uncommon in a typical infant's life. The primary observation noted here is very simple: more vocalizations. Why did they vocalize more when hearing another infant's crying? Because there was no indication that their increased vocalizations were associated with distress, it was unlikely to be a result of emotional contagion or empathic response. In fact, with no indication of an affective shift, there is a strong reason to believe that the previously engaging and alert infants might have simply become "more" interested and curious about the sudden introduction of another infant's crying.

For the other group of calm and alert infants, they heard a somewhat "familiar"

and unrealistic presentation of their own crying. Why did this strange exposure to their own crying make them vocalize less? Butterworth (1990) would say that it is because the infants could identify their own crying, suggesting that they possess a core auditory sense of self. From a phenomenological perspective, there is no need to attribute this observation to a cognitive operation of “identifying” or “distinguishing.” From the viewpoint of the engaging and alert infants, decreased vocalizations could simply point to a lowered level of overall interest due to a disruption of alertness or even a state of confusion. The global world became rather confusing when they simultaneously experience two contradictory affective expressions—one indicates interested engagement and the other signals distress. As a result, their overall level of engagement decreased as shown by their less vocalization.

Thus, the reason why infants responded differently in these two experimental conditions is explainable without postulating a core identity of self or the other, or a discriminatory consciousness. From the standpoint of an intersubjective ontology, the embodied infants directly perceived the cry of another infant as an invitation to become more engaged and curious about this unfamiliar expression of distress. This is a leaner explanation that attributes the infants’ increased vocalizations to their attunement to the crying of another infant. In the same vein, the infants of another group perceived their own recorded crying as contradictory to their current affective state—the world showed up as somewhat confusing with an apparent conflict between two affective expressions of their own. There was a blatant tension between the calm, alert and vocalizing infant, and the distressed, crying infant from the recorder (decreased vocalization is an inevitable outcome). Infants might not have been completely lost in this tension, but hearing their

own crying sound from an external source was enough of a distraction or confusion that decreased their level of engagement in the world.

Reflecting on the Experience of the Crying and Distressed Infants

In the other half of experimental scenarios, the infants began in a somewhat distressed state for whatever reason, as they were already crying prior to the introduction of the auditory presentations. For them, it was an unsatisfying or distressed world. They cried less when hearing their own crying from a recorder, and they cried more when hearing the cry of a different baby. These findings have been interpreted as their ability to identify their own voices as uniquely distinct from other voices, which would suggest a core sense of self and a core sense of others.

However, these observations are also explainable without the idea of a mind that actively discriminates between what is self and what is others. One group of distressed infants perceived their own crying voices from the recorder as a familiar auditory expression of an affective state, which might have cancelled out some of their own crying effort and produced a sense of confusion in them. This explanation reveals a relatively loosened boundary between inner and outer regions of infants' existence—an “external source” of their own crying was felt as “real” to some extent. The other group of distressed infants perceived a different infant's crying as an unfamiliar auditory interference to their own crying endeavor, which might also have caused more distress in these infants resulting in more crying.

In retrospect, there were two experimental conditions in the whole experiment that hold a strong ecological relevance: the infants in two affective states (calm and alert; distressed) hearing the crying of another baby. In contrast, there were two relatively

“unrealistic” conditions, in which the infants in two different affective states heard their own crying from a recorder. Not surprisingly, these infants all showed decreased level of activity—less vocalization and less crying. For them, hearing their own crying voice, consistent with their current affect or not, lowered their activity level. Neither case necessarily indicates an ontological demarcation between the self and others. In conclusion, an intersubjective or intercorporeal ontology suggests that the self and others are intertwined at the level of experience in the infant’s world, without a reflective differentiation between the two ontological terms. As demonstrated in this section, this nondualistic ontology is fully capable of explaining the experimental findings without resorting to the notion of a mind that actively discriminate between the self and others.

The Question of Emotional Contagion

If the infant’s world is syncretic in nature and there is a lack of thematic differentiation between herself and others, why is there no conclusive evidence of emotional contagion in this study? This is a complex theoretical question requiring more empirical evidence to provide an answer because the key is to determine the conditions in which emotional contagion would occur. Does it require the infant’s own emotional state to be somewhat “closer,” or at least not contradictory, to the emotional stimulus for contagion to happen? Does it depend on the kind and intensity of the emotional stimulus? For example, there might be many different “cries” and only some are potentially contagious. Does the image of a crying infant increase the likelihood for contagion to happen? These are very important questions that cannot be thoroughly addressed based on one study. However, our phenomenological reflections on the various scenarios in this study suggest that it is important to take into account the infant’s affective states at

the beginning of the experiment.

First of all, the infant's own crying presented in a recorder does not trigger a contagious response regardless if she is already in distress or a relatively calm state, because this "unrealistic" voice was confusing the calm infants and canceling out some of the crying efforts of the distressed infants, as discussed before. When difference in affective states are ruled out, it has been shown that newborns who are presented with other infants' versus their own crying sounds demonstrate more and longer-lasting distressed facial expressions (Dondi et al., 1999). Second, we need to examine why there seems to be a "contagion effect" in the distressed infants hearing the cry of a different infant, but not in the calm infants in the same situation. It seems that at least one of our hypotheses is correct; emotional contagion seems to require the infants' own emotional state to be "closer" to the emotional stimulus (i.e. crying in distress). Accordingly, the calm and engaging infants become more curious and interested in the cry of another infant, whereas the already-distressed infants seem to become more distressed in the same situation. It may be that the cry of another adds to the distress and makes the reason for crying more urgent and real. Hence, the contagion of cries is a fundamentally social response to a threatening world.

4.6 Research on Representations of Self and Others

In order to further examine the nature of infant's sociality, it is necessary to look at the research studies involving more complex forms of interactions. These interactions are founded on intricate facial movements such as "mouth openings, eyebrow raises, shifts of head orientation, shifts in direction of gaze, smiles, frowns, grimaces, sobering, and so forth" (Beebe & Lachman, 2002, p.90). The ontological issues associated with

infant-adult interactions in the research literature can be divided into two themes.

The first theme is the portrayal of the infant-adult dyad as discrete conscious subjects reacting to each other's actions. Nevertheless, the rapidity of facial interactions demonstrated in empirical research does not support the stimulus-response model of interaction, because the high-speed exchange of facial gestures is actually faster than visual reaction time. In particular, Cohn and Beebe (1990) found on infant-mother partners these facial contingencies at 1/12-second interval; in other words, before one partner's gesturing is completed, the other partner has already begun gesturing. Some researchers used video technology to analyze infant-adult facial interactions frame by frame in slow motion, revealing the subtleties in these interactive exchanges (Beebe & Gerstman, 1980). For example, whereas infant-adult interactions are primarily characterized by imitative and matching gestures, it was found that an exact facial match rarely took place. Hence, a better characterization of facial interaction is that the infant and the adult partner are "moving in the same affective direction" (Beebe & Lachman, 2002, p.95).

Furthermore, a closer look at these studies reveals a second ontological issue. In the former chapter, it is suggested that the concept of representation has often been viewed as the only explanation for infant's intelligent and learning behaviors—the missing link that connects the past and the present, although there is no direct evidence that affirms the existence of internal representation. Nevertheless, its ontological consequence is nothing but a full-blown Cartesian dualism: the internal mind that makes and stores mental copies of the external world. Nonetheless, representational concepts continue to influence the psychological explanations for social behaviors and interactive

patterns observed in infant research. In this section, we will reexamine some of the major empirical findings that have been interpreted as the evidence of social-based representations. Our exploration is guided by the following ontological question: Is the concept of representations necessary to explain infant's social behaviors that indicate the influence of memorization and learning?

Previously, we attempted to deconstruct the thesis of a “discriminatory consciousness” by showing that infant's conscious existence is not preoccupied with a mental project in actively differentiating between the self and others. However, there is another layer to the problem of this thesis. According to Stern (1998), the infant's mind actively divides her experiences into “self-invariants” and “other-invariants,” which become the foundation of internal representations of the self, others, and their interactions.

The classic concept of representation has undergone a transformation in contemporary infant literature. Let us consider the following issue: if “symbolic” representations or schemas (dynamic or static) are considered as the prerequisite of intelligent or meaningful social behaviors as the basic units of learning and memory, it would render such behaviors incomprehensible in the infant's “presymbolic” world. As a result, a conceptual revision of representation is needed. For Beebe and Lachman (2002), this revised concept is called presymbolic representation. Well-aware of the historical critiques concerning representationalism, they make a deliberate effort to redefine representations as an ongoing process of “the mind that updates its map”:

Representations are formed by the active process of constructing and reconstructing incoming information. They can be reorganized and transformed as incoming information is reinterpreted and reordered on the basis of past experience and current expectations (p.148).

Nevertheless, such an effort has succeeded only in deconstructing the static quality of mental representations. Symbolic or pre-symbolic representations are conceived as something real that have been “formed” or “created” and stored as the basis of which ongoing experience is being organized or influenced. This continuing endeavor to revise representational concepts demonstrates a deeply-entrenched commitment to the representational model of mind, widely shared by contemporary psychologists and scholars.

For instance, Stern (1996) also adopts a representational model for conceiving infant’s social experience, which is known as RIGs, or representations-of-interaction-generalized. He considers these entities as the basic units of memory, but there is no direct evidence for their existence as well. The concept of RIGs is a theoretical construct based on empirical evidence that demonstrate the infant’s capacity to memorize, recognize, and generalize/abstract interactive experiences. Not surprisingly, Stern’s reconstruction of the infant’s world has been subjected to criticisms for its commitment to the language of “natural scientific” psychology—subject-object, mental representation-reality, internal-external, and other dualistic ontological convictions (Simms, 1993, p.33). In particular, he distinguishes between external objective events and internal subjective experience in the social domain of infant’s existence. Accordingly, creating a bridging process between the two becomes theoretically inevitable. Stern (1996) refers to this process as one in which the objective social events are transformed into subjective experiences.

Presymbolic Representations

Based on an abundance of existing research experiments and naturalistic evidence, Beebe and Lachman (2002) suggest that infants possess presymbolic representational capacities that actively organize social interactions. They argue that representations are being formed to render the social world predictable and expectable. They outline three principles of “salience,” according to which these representations are organized and “internalized.” These principles provide a bridge between observations from infant research and psychoanalytic theories, which is the major purpose of their work.

First, regularity and repetition in social interactions create expectancies and predictabilities, which are captured by the “principle of ongoing regulations.” Second, there is the “principle of disruption and repair,” which refers to social experiences that “disrupt his interactions or violates his expectancies, along with subsequent effort to repair disruptions” (p.145). Then, finally, the “principle of heightened affective moments,” both positive and negative, suggests that intense affective experiences are a powerful force in organizing infant’s social perception.

The supporting evidence for presymbolic representations can be divided into four categories: temporal consistency of organized behavioral patterns, generalization of aberrant patterns of interaction, differently organized brain activities based on interactive experience, and the enduring effect of violated social expectancies. First, there is evidence that organized patterns of interactive behaviors of a mother-infant dyad, such as facial affects, looking patterns and gestures, are consistent over time (e.g., Weinberg, 1991). Second, research shows that infants who demonstrated aberrant interactive behavior with “depressed” mothers, such as protest and disengagement, behaved

similarly with a new nondepressed, well-attuned female adult. Third, in one research study (Dawson, 1992a, b), two groups of infants were exposed to the same event—their mothers initiating peek-a-boo play with them. Whereas the group with “normal mothers” showed positive-affect behavior and EEG pattern, the group with “depressed mothers” evidenced negative-affect behavior and EEG pattern of activation.

Finally, the enduring effect of violated expectancies is also considered as the evidence of presymbolic representation. This is best demonstrated by the still-face paradigm (Tronick et al., 1978). The mothers in this experiment were first instructed to play with their infants normally, and then with a “still-face” (no facial movements and vocalizations) for the same amount of time. The infants smiled and cooed repeatedly to elicit a response from their mothers, showed surprised reactions upon their failure to respond, and continued cycling through disengagement and repeated attempts to elicit a response. In another “violation of contingency” study (Murray, 1991; Murray & Trevarthen, 1985), infants looked at a videotape of their mothers responding to them in an interaction that was recorded a few minutes ago, and they showed a similar pattern of attempts to elicit a maternal response and distressed engagement. In addition, coping strategies of infants in the “still-face” experiment actually predict attachment styles (Cohn, Campbell, & Ross, 1991). In particular, infants who used positive soliciting strategies—smiling and cooing—are more likely to develop secure attachment. In contrast, the relative absence of positive solicitation appears to predict anxious attachment.

These are the empirical evidence that led to a variety of representational interpretations. Among other infant researchers, Beebe and Lachman (2002) articulate

extensively on the concept of presymbolic representation: Interactive experiences are “encoded in a nonverbal, implicit mode of information, which may be motoric (procedural), imagistic, acoustic, or visceral” (p.149). In order to make sense of the experimental outcomes in the aforementioned studies, they attribute to a “remarkable set of presymbolic representational capacities” already present in the first year of life:

The infant perceives features, can translate cross-modally, can detect whether or not the partner is acting contingently, and can tell whether behavior patterns are similar or different. The infant develops expectancies of these patterns, remembers them, and categorizes them. These expectations are organized through time, space, affect, and arousal. This is the equipment the baby use to develop presymbolic representations (p.78).

According to this point of view, what is basic to representations is the capacity to order and recognize patterns, to expect what is predictable and invariant, and to create categories for these invariants. Hence, in order to account for the temporal consistency, generalization, and enduring effects of the infant’s interactive experiences, the representational explanation is in fact quite appealing: “Representations are more or less persistent, organized classifications of information about an expected interactive sequence” (Beebe & Lachman, 2002, p.148).

Nonrepresentational Interpretations

Dreyfus (2002) discusses a major issue associated with literally all of the representational concepts: among the millions of represented facts, how does the mind figure out which ones are relevant to the current situation, which ones stay the same, and which ones need to be updated? This is known as the “relevance/frame” problem. Merleau-Ponty (1962) argues that such “relevance” is already implicated in our primordial engagement in the world, whereas psychologists under the influence of

cognitivism and representationalism continue to utilize internally stored representations as the middle term between an inner mind and an outer world.

Without representational explanations, how do we make sense of the temporal consistency in infant's interactive behaviors, negative or positive? How do we explain that the infant's brain structures appear to be organized over time in terms of the quality of interactions? How does the infant's derailed interactive experiences with one adult become generalized and affect her approach with other adults, and how do we understand their enduring effects over time? What are some alternative explanations that are consistent with the intersubjective ontology established in this chapter, without recourse to the hypothetical representational entities of which there is no direct evidence?

The place to start is an alternative phenomenological concept of learning as discussed in the previous chapter, which is termed “nonconceptual embodied coping skills” (Dreyfus, 2002). According to this idea, bodily intentionality not only implies that immediate bodily actions are meaningful and purposeful, but they are also indicative of intelligence and learning. The embodied infant is pre-reflectively drawn to refine her perceptual skills and actions in order to cope with the world as an intelligent being.

Dreyfus (2002) borrows two notions from Merleau-Ponty—the intentional arc and the tendency to achieve maximal grip—in order to supplement a nonrepresentational account of what he called skillful perceptions and actions. The intentional arc refers to a tightly “coupled” relationship between the body and the world. The embodied infant acquires skills from her participation in the world, which become dispositions to respond to the solicitations of situations in the world: “[T]he way our successful coping continually enriches the way things in the world show up” (Dreyfus, 2005, p.6). The

tendency for the embodied infant to achieve maximal grip means that her body is dedicated to refine its responses so as to bring the current situation closer to an optimal gestalt. Through experiences of “successful” coping, the infant develops refined perceptions and skillful actions that gradually become habitual, as sediments of their behavioral repertoire. Hence, it has been observed that infants gradually develop habitual patterns of facial affects, looking patterns, and behavioral gestures, demonstrating a stronger social presence in the eyes of adults (Weinberg, 1991).

This phenomenological concept of embodied learning can explain why the infant’s interactive behaviors are relatively consistent over time, regardless if they are considered positive or negative. As embodied agents coping in their social world, infants continually develop refined perceptions and behavioral responses based on their everyday interactive experiences with proximal caregivers. These experiences are not recorded frame-by-frame inside the mind and stored as internal representations. From a phenomenological perspective, when infants encounter the same social partners, they directly perceive the physiognomies on their faces as an invitation to respond in particular ways. In other words, their interactive patterns gradually become more habitual in both perceptual and behavioral dimensions. Unlike the representational explanations, infants respond directly to the solicitations rather than the sources of the invitation (Taylor, 2005), which can be considered as an example of “affordances” in the social dimension.

This phenomenological explanation based on direct perception of *social affordances* can effectively account for the immediacy of interactive behaviors that are indicative of embodied coping. For instance, Beebe and Stern (1977) found that maternal

over-stimulation and infant withdrawal are quite common in normal infant-mother interactions, and one of these examples is captured by the “Chase-and-Dodge” game:

As the mother ‘looms’ into the baby’s face, the baby’s head moves back and away. The mother then ‘chases’ by moving her head and body toward the baby. As she chases, the baby simultaneously moves his head still farther away. These sequences occur with split-second response so that, the baby, he has already begun to move away (Beebe & Lachman, 2002, p.111).

In this example, the baby directly perceives the mother’s “looming” face as a solicitation for evasive actions. Hence, the baby keeps moving her head farther and farther away, not simply as a response to her mother’s chasing, but actually as a preemptive strategy to avoid the anticipated overstimulation and minimized the associated anxiety. Thus, these seemingly “negative” interactive behaviors are also indicative of successful coping. From this perspective, the infant’s protest and disengagement can be considered as adaptive (defensive) behaviors—the enduring interactive patterns in coping with a depressed mother who might be inconsistent, unavailable, unresponsive, or intrusive.

As intelligent embodied agents, infants not only develop consistent habitual patterns across time, but also generalize their approach across similar situations. Hence, research shows that the infants’ aberrant interactive patterns with depressed mothers were replicated when encountering a different female. In addition, affective experience provides a strong organizing force in infant’s world, as discussed before. Thus, the negative affects associated with the infant’s aberrant interactive experiences with a depressed mother—such as overstimulation, anxiety, and so forth—directly shape the process of embodied coping. For instance, the “still-face” experiment (Tronick et al., 1978) demonstrates the powerful organizing force of negative affects in the infant’s world, because an immediate impact on the infants’ interactive behaviors was already

evident after a few trials, regardless if their mothers were considered depressed or healthy. This is described by the principle of “disruption and repair” as mentioned before (Beebe & Lachman, 2002).

For these infants, their aberrant interactive behaviors are not only specific to their own mothers, but also become generalized into habitual patterns across different social situations involving different social partners. From a phenomenological perspective, when these infants encounter a different female, for instance, they perceive in her not an external image that matches or resembles their mothers, which would then summon an internal representation of interactive sequences or expectations. Based on the idea of direct perception, they are plunged into actions upon seeing the face of another female, because it directly solicits in them a certain pattern of responses.

The “still-face” experiment (Tronick et al., 1978) adds that the infants’ strategies for coping with “violated-expectancy” not only reflect habitual interactive patterns with mother, but also imply potentially enduring outcomes such as attachment styles or even personality traits. According to the researchers, the presence of positive strategies to elicit a response from the mothers seems to reflect the foundation of secure attachment; and the relative absence of such positive coping appears to predict anxious attachment.

In addition, even though all the infants were exposed to the same stimulus (a “still-face”), so to speak, they did not directly perceive the same *social affordances* that would call for the same coping behaviors. The “still-faces” of the normally-responsive but nonintrusive mothers directly summoned the infants to respond with positive behaviors, such as smiling and cooing, so as to solicit the positive maternal responses that they expected and desired. In contrast, the “still-faces” of the more unresponsive or

intrusive mothers directly called for a pattern of more avoidant and passive behaviors, because successful solicitations of maternal response would have brought about overstimulation or more anxiety.

Finally, the study by Dawson (1992a, b) basically provides an inside view of the brain that shows what might have been the neurological counterpart of the infant's embodied coping experiences. Because affects are intertwined with perception from the perspective of embodied coping, the infant's neuro-affective systems seem to develop according to the quality of interactive experiences with her mothers. In their experiment, even though all the infants were playing the same peek-a-boo game with their own mothers, their neuro-affective responses corresponded to the specific interactive patterns associated with either the "normal" or "depressed" mothers.

In conclusion, the phenomenological notions of direct perception and embodied coping skills could effectively account for all of the empirical evidence that has been taken as the proof of presymbolic representations. The literal existence of representations is always inferential, and their ontological implications are often very problematic, as discussed here. Hence, Gallagher (2008) argues that it would be more economical and parsimonious to explain social phenomena without representational concepts.

Chapter 5

Dissertation Conclusions and Discussion

5.1 Infant Research and the Phenomenological-Hermeneutic Method

There is no doubt that recent developments in infant research deserve tremendous appreciation. From a methodological standpoint, many of these studies are carefully and brilliantly designed to address some specific theoretical questions in infant psychology. Our current project respectfully treats the entire field of infant experimental research as an invaluable pool of data for further phenomenological exploration.

Nevertheless, from a phenomenological-hermeneutic perspective, we attempted to take on several “gray” areas in infant research in order to enrich our understanding of the deeper implications of empirical findings. First, our critical reexamination of a number of selected research experiments revealed the circular relationship between brute observational data, theoretical explanations, and ontological underpinnings. For example, we showed that the age-old theoretical debates about the “drawbridge phenomenon” can be attributed to an underlying dualistic framework that renders two competing explanations mutually exclusive. Also, we challenged and deconstructed the rationale of some of the “ontological leaps” that infant researchers often make based on observational data in their studies.

Second, our critical reflection on the experimental procedures and setups, such as the habituation-dishabituation, preferential-looking, and violation-of-expectancy

paradigms, highlighted the importance of examining the ecological validity of these artificial experimental situations. We argued that this is especially important when drawing ontological relevance from the infant's behaviors observed in experimental settings.

Finally, we approached these research studies from a phenomenological perspective by establishing their "lived-contexts" and offering a more integrated phenomenological account for their findings. Unlike most infant researchers, we attempted to pay extra attention to the minor details and nuances of the infant's experience in experimental situations, viewing each experiment in terms of the unique spatio-temporal unfolding of events as experienced by the infant participants.

Our phenomenological-hermeneutic interpretive method was built on an understanding of the ontologies of developmental research. Throughout this project, we followed through this emphasis by systematically explicating a variety of dualistic assumptions in infant literature. Again, this kind of scholarly effort is beyond the capacity of experimental methods and statistical analysis, and is more philosophically-grounded and comprehensive.

We provided an extensive overview of the dualistic issues associated with each topic areas in infant research, as well as an explicit, alternative nondualistic framework upon which further analyses of the research studies were done. We distinguished between the descriptive, behavioral descriptions from the researchers' theoretical or conceptual interpretations in the research literature. In turn, our method allowed us to systematically deconstruct the dualistic explanations and establish a phenomenological account for the experimental outcomes; these efforts provided an empirical ground for

our nondualistic framework. Furthermore, our method guided us to reveal the simplifications and generalizations underlying these dualistic assumptions (e.g., the comparison between visual occlusion and darkness). Conversely, we fully spelled out our circular, hermeneutic re-reading of the written infant research records, allowing the progression of our reasoning or thinking to be reexamined and reflected upon by other readers.

5.2 The “Story” about the Infants in this Project²³

In retrospect, this project follows two trajectories. On the one hand, it seeks to show the relevance of a nondualistic ontology by reinterpreting empirical infant studies as its supporting evidence; this is an example of how an ontological inquiry can be based on empirical research evidence, which is a contribution to all scholars who are interested in addressing ontological issues in science. On the other hand, our analysis also attempts to demonstrate the legitimacy of phenomenological and nonconceptual concepts, which are rooted in this nondualistic ontology, in explaining the experimental outcomes and observations in these research studies. This dissertation is an example of how an alternative ontological framework can serve as the starting point of psychological interpretations and also thereby is a direct contribution to infant psychological research.

To sum up, we believe that the primary contribution of this investigation lies in our demonstration of the legitimacy of the phenomenological, nonconceptual, and nonrepresentational explanations for accounting for experimental findings in infant research. Without these “grounded” explorations, our effort to validate a nondualistic ontology would be much more difficult and unconvincing. The “story” about the infants

²³ This characterization of a “story” is in reference to Rochat’s (2001) discussion of validity.

that has emerged through our investigation is precisely founded on such a nondualistic ontology. Let us take a closer look at this vision of the infants in a nondualistic world.

As discussed before, the lived-world is a philosophical notion that transcends the Cartesian subject-object and inner-outer distinctions. When these dualistic conceptions are replaced by the idea of the lived-world, the infants' actions toward the objects in the world become understandable without the hypothetical cognitive operations. This vision of the infants' lived-world points to the fact that their bodily capacities are inextricably connected to their interest and grasp of the objects. As demonstrated in our analysis of the object-permanence research, when the former becomes increasingly advanced, the latter is correspondingly transformed. This idea is expressed in Merleau-Ponty's articulation of the "intentional arc" which ties the subject and the objects (and the world) in a tightly-webbed system. In other words, it is not necessary to rely on the model of a mind or consciousness and the hypothetical internal entities (i.e., internal cognitive schemas or representations) in order to explain the changing nature of the relationship between infants and the objects. For the idea of internal knowledge or understanding is inevitably associated with some forms of mental representations, the notion of physical/object knowledge might not be the best characterization for the infant behaviors described by the researchers.

Based on an integrated subject-object view of object perception, the phenomenal world is envisioned as always in the process of becoming, never determinate; it is always partial but fully meaningful. For infants, a perceived object is neither a factual entity in the physical world nor a subjective, mental construction—rather, it is *in-itself-for-us*. The objects in the phenomenal world do not appear to infants as fully-determinate objects,

and are never given to them completely and totally in perception. As Merleau-Ponty (1962) suggest, “the presence and absence of external objects are only variations within a field of primordial presence” (p.106). Thus, partiality is always an integrated aspect of a perceived object; thus, it is not the concept of object-permanence that drives the infants to retrieve a partially-hidden object as discussed in our analysis of the object-permanence research.

From a phenomenological standpoint, infants’ visual perception of an object immediately brings about a simultaneous perception of its touchability. Thus, the “out of sight, out of mind” metaphor is not quite accurate. Touchable objects are permanent entities in the world; thus, the so-called permanence of objects is in a way already implicated in infants’ embodied situation. In addition, because infants’ actions are concretely tied to the specific objects in the world, all the sensory components associated with a perceived object are integral to its identity. Thus, when one component (e.g., the sound) is removed, it is no longer the same phenomenal object for them. Accordingly, instead of thinking about object-permanence as a concept that infants gradually acquire, it is more appropriate to conceive the infants’ actions toward the objects during the first year in terms of how their grip of the visible and touchable objects might change over time. According to Merleau-Ponty (1962), this progression can be captured by the transition from *concrete* movement to *abstract* movement. Our explication of this transition can be summarized as follows:

At the beginning, the newborns’ bodily interest and actions are tied to their immediate visual grip of the objects. The attention flow of newborns is characterized by a continuous flow in which their visual focus is repeatedly being redirected toward the

next interesting thing or event that remains visually accessible and potentially touchable. The visual absence of an object means termination of interest for them. Gradually over the next six or seven months, as the infants' motor capacities and visual tracking abilities become increasingly advanced, their relationship to the objects continue to expand in both spatial and temporal dimensions. Correspondingly, some embodied, nonconceptual expectations about the visual-and-touchable objects become to develop. Thus, infants between one to four months of age seem to be somewhat "shocked" by the sudden disappearance of an interesting object. Beginning at around the eighth month, their bodily capacities allow them to track and anticipate the movement of an object, and to perceive the "affordance" of a partially-occluded object as a possible motor project in retrieving it. According to Merleau-Ponty (1962), however, these achievements are still only indicators of "concrete movement." Soon after that, nonetheless, infants begin to demonstrate the ability to carry out "abstract movements" based on a pre-reflective, embodied understanding of how their actions toward one object can open up the "future space" or further potential motor actions. Perceiving an obstacle as an object that, if removed, can reveal the visibility and touchability of an interesting object, is an example of this achievement.

The image of an infant that emerges in this project is also much more holistic than the separate theoretical camps within infant research. For example, our extensive analysis of the drawbridge phenomenon provides a portrayal of the infants who have both natural perceptual inclinations and preferences, as well as some embodied understandings of the objects-in-motion. This idea has contributed to our understanding of the age-old debate between the perceptual-processing and the conceptual explanations about the

drawbridge study, and provided a clarifying account for the variable outcomes in other versions of the drawbridge study.

Infants do not live in a world inhabited by an array of still objects. From a phenomenological perspective, their phenomenal world also includes constant motions and pure movements (Merleau-Ponty, 1962). Hence, movement is not a secondary property of the objects in the perceptual world; rather, it is central to the identity of the objects-in-motion. Based on Merleau-Ponty's description of movement perception, it is shown that infants perceive or decipher the "behavior" of the moving object, or the manner of its passing, so to speak. According to this idea, the perception of something in "transit" must be understood as fundamentally anticipatory or "hypothesis-generating." This notion of movement perception requires neither "mental tracking" nor conceptual knowledge of the permanence and continuity of objects in motion.

Lastly, infants' phenomenal world is not fundamentally a categorical world—in other words, they do not perceive discrete categories in their natural habitat. Nevertheless, the ways in which multiple objects show up in the infants' lived-world (which speaks to a process of perceptual organization) are intertwined with their bodily interest and inclinations (or "motivation"). When an experience is introduced to alter their bodily interest and inclinations, such as the habituation experimental process, infants can be "motivated" to reorganize or reconfigure their perceptions. For example, our phenomenological reflection on the infants' experience in a particular experimental situation shows that their perceptual organization was "motivated" by the displeasure associated with the habituation process. This process propelled them to pull together some of the "generalizable" features of these objects. This idea should inspire further

inquiries about whether or not the development of more advanced object categories is a purely natural process, or whether “motivations” from our interpersonal and social/cultural existence play a role in shaping the process of object categorization as well.

Our portrayal of the infants’ lived-body is a deliberate effort to overcome the mind-body dualism in infant literature. From our point of view, the dualistic conceptions about how the mind controls and directs the body to act intelligently do not fit with the immediacy of infant behaviors as observed empirically. Our explication of Merleau-Ponty’s notion of the lived-body not only reveals the infant’s motor intentionality which is the foundation of a primordial sense of “I can,” but also articulates an idea of bodily intentionality that is fully capable of accounting for learned and intelligent actions.

These ideas about embodied infants are in sharp contrast to the classical view of the body as a mechanical and physical entity in infant literature. Our nondualistic framework shows that the lived-body is coupled with the world, actively structures the practical space, responds directly to any spatial changes, and is fully aware of itself in both proprioceptive and affective domains. These ideas provide a vision of the infants as pre-reflective embodied *copers*. Rather than acting as little scientists observing the world from a neutral and removed perspective, the embodied infants directly and pre-reflectively cope with the world through refining their perceptions and actions.

As embodied *copers*, infants are motivated by an innate tendency to achieve a “maximal grip” of the world, which is the basis of a revolutionary model of skilled perceptions and actions (Dreyfus, 2002, 2007). Thus, they directly perceive the “affordances” of worldly objects as solicitations of situations in the world, which propel them to respond in a certain manner—in other words, affordances are both perceptual and

action-oriented. As Merleau-Ponty (1962) suggests, “any mechanistic theory runs up against the fact that the learning process is systematic; the subject does not weld together individual movements and individual stimuli but acquires the power to respond with a certain type of solution to situations of a certain general form” (p.164).

This vision of intelligent and learned behaviors suggests that the infants’ lived-body automatically reconfigures itself in response to some handicapped situations. Merleau-Ponty (1964) also highlights this compensatory capacity of the lived-body in his discussion of a patient with brain injuries. As our analysis has shown, when the light is turned off, the darkness immediately reconfigures the embodied infants’ relationship with the objects that were previously reachable and visible. In this relatively handicapped situation, the auditory sense of space is immediately accentuated.

In addition, because infants are intelligent embodied beings always in the process of coping with the world, successful experiences bring about perceptual refinement for them. As they become increasingly refined in perceiving solicitations of situations in the world, their actions correspondingly become more skilled. This process is evident in our exploration of what the infants might have acquired during the familiarization process in several memory-and-learning-related experiments. These “situations” are not fixed and determinate features of the environment, nor are they rigid mental schemas that neglect the surrounding world.

The perception of “affordances” or solicitations is fundamentally anticipatory and always tied to our bodily capacities and interest. Our skillful perception and actions form a web of intelligence that continues to feed on more relevant experiences. Thus, in embodied coping, memory works at the level of direct perception and immediate actions.

For instance, through successful reaching toward the different sound-making objects during the familiarization trials of an experiment, the infants became perceptually refined to such an extent that the sounds presented in the dark immediately propelled them to engage in a particular manner of reaching.

However, the embodied infants are dedicated not only to mastering skillful perception and actions in the physical aspect of the world (e.g., reaching with hands), but also to refining their social behaviors based on affective experiences. In this sense, infants are coping with both the physical and socio-affective aspects of the world. Affects played a major role in determining the ways in which the infants coped in the puppet experiment. For example, on the one hand, the “smilers” were motivated to initiate what was perceived as the beginning of a pleasant interaction through smiling and sustained visual attention. On the other hand, in contrast, the nonsmilers were motivated to look longer at the novel puppet—partly as a quick termination of what was perceived as the start of a boring/unpleasant experience, and partly as an attempt to search for something more interesting or pleasant.

The sum up, the notion of the lived-body supports an idea of bodily intentionality that is not trapped within immediacy, and thus, allows for an account of intelligent and learning behaviors without representations. In embodied coping, infants’ perception and actions are not only tied to each other, but they are also immediate, anticipatory and “memory-based.

From the perspective of an intersubjective ontology, the infants’ social world is fundamentally a communal world. This concept provides an alternative ontological ground for infant researchers to situate their interpretive inquiries. In particular, the

starting point for such investigation no longer has to begin and end with the notion of a self. Unlike some researchers who insist that the human face is no different from other objects that move and speak, our phenomenological analysis of the empirical findings suggests that infants have an inherent awareness of human forms. Furthermore, their conscious social existence is characterized by a state of being present with others (“*compresence*”) or coexisting with others (co-existentiality). As Merleau-Ponty (1962) also suggests, “we must therefore rediscover...the social world, not as an object or sum of objects, but as a permanent field or dimension of existence” (p.420).

From a dualistic point of view, the infants’ sociality is conceived in terms of an isolated conscious subject against other separate individuals. Infants are so deeply entrenched in their sociality that they demonstrate a tendency to perceive the inanimate as the animate. Not only do they imitate the movements of an inanimate object, but they also tend to perceive a sense of social intentionality from dynamic displays of movement involving two objects.

In addition, the body is often conceived as under complete control of an overseeing mind; hence, the boundary of the physical body is considered as the boundary of the self. However, our reflection on infants’ facial and emotional imitations provides a testimony to the “anonymity” or generality of their body, effectively deconstructing the idea that the physical body marks the territory of an individual selfhood. As Merleau-Ponty (1962) also suggests, “I experience my body as the power of adopting certain forms of behavior and a certain world...now, it is precisely my body which perceives the body of another, and discovers in that other body a miraculous prolongation of my own intentions, a familiar way of dealing with the world” (p.142).

Hence, the infants' earliest sociality is syncretic by nature because there is no reflective thematization of the self and others. This lack of thematization is not the same as a complete undifferentiation or confusion. Through the transfer of corporeal schemas, infants' perception of others is immediately an invitation to adopt their gestures and emotions in their own body. The phenomenon of infantile imitation in both facial and emotional dimensions is based on a primordial identification between embodied beings in a common world, without a reflective awareness of the identities of self and the other. This characterization again speaks to a kind of co-existence or an "anonymous collectivity." In our point of view, these primordial imitative exchanges are foundational to the infants' social development, including the ongoing, interaction-based process of facial configurations and the integration between her proprioceptive body and her mirror-image.

In the intersubjective world, the infants' sociality is not based on interacting minds but the fundamental transferability of intertwining bodies. The intentions of embodied beings (infants and adults) always play across each other through the transfer of corporeal schemas, and thus, the problem of how to access other minds is no longer the same issue under the ontology of intersubjectivity. Prior to the development of any "theories of mind," it seems that infants do perceive other human beings as intentional in a pre-reflective and embodied manner. The infants' social existence, so to speak, is characterized by the interplays of intentional embodied beings.

Infants are not confused in a syncretic social world. An intersubjective ontology does not support the hypothesis that infants would be constantly living in confusion in this world, and thus, it is different from the psychoanalytic portrayal of a completely

undifferentiated, symbiotic relationship. Our vision of infants' intersubjective existence is capable of accounting for the evidence suggesting that they can "distinguish" and "discriminate" between what belongs to themselves and what belongs to others.

As embodied agents coping with an intersubjective world, infants' social existence is not preoccupied with a mental project of discriminating and grouping from experiences what belongs to self and what belongs to others. Accordingly, the idea of self-and/or-other-representations, which is the logical consequence of the hypothesis of a "discriminatory consciousness," is also problematic under this intersubjective ontology. In contrast, our nondualistic framework provides a vision of the embodied infants who can also directly cope with the vicissitudes of their social experience without mental representations. Unlike the representational explanation, this integrated view of social perception and action captures the immediacy of meaningful, adaptive, and learned interactive behaviors of infants. From this perspective, infants only "memorize" their interactive experience insofar as it refines their direct and immediate perceptual repertoire in social situations, and automatically propels them to act in certain anticipatory manners as a mean to cope intelligently. Given that the literal existence of representations is always inferential, Dreyfus (2008) is correct that it is also more economical and parsimonious to explain social phenomenon without representational concepts.

5.3 Concluding Thoughts

The discussion of the limitations of this entire project can be divided into two levels: ontological and theoretical/developmental. In our point of view, it is impossible to fully validate an ontological framework based on experimental studies because there is a

limitation of the data collected in these artificial settings, which might not speak to the ontological structures of human beings in their natural habitat.

Ontology is an incredibly complex field of philosophical inquiry. Our investigation endeavors to ground ontological exploration on written records of experimental research in infant psychology. Nonetheless, our conclusions do not do justice to the diversity of ontological thoughts. On the one hand, for the purpose of this project, we are fully aware of the generalizations and simplifications being made concerning the dualistic remnants in contemporary infant literature. For the most part, we had no intention to single out individual scholars as the culprits of Cartesian dualism in infant psychology. Many quotations were chosen for the sole purpose of highlighting the most common misconceptions rooted in dualism. In fact, we noticed through our extensive review of the literature an interesting tendency of infant research scholars and theorists: an occasional shift between dualistic and “anti-dualistic”²⁴ propositions in the progression of their writings.

Our phenomenological-hermeneutic method brings about a conscious effort to limit any “ungrounded” philosophical explorations that might be too removed from the experimental outcomes and observations. Thus, it is correct to say that our chain of thoughts and arguments presented here do not fully represent the nondualistic ontology proposed by Merleau-Ponty through many years of writings. As a matter of fact, there is already a diversity of ontological thought in philosophy that can be considered as nondualistic, and their potential application to experimental research awaits further

²⁴ At times, most of these infant researchers and scholars would make a statement explicitly stating their refutation of dualism, even though a lot of their conceptions and explanations are based on a dualistic framework, of which they seem to be unaware.

exploration.

This project is also limited in its scope of theoretical-developmental exploration as well. In fact, we do not consider this project as a well worked-out, alternative developmental theory of infancy. Our emphasis is on demonstrating the legitimacy of nondualistic, phenomenological explanations in accounting for empirical findings, with the hope of inspiring further explications of human development based on scientific psychological research. Nevertheless, we do not suggest that the term “nondualistic ontology” is the font of truth: it does not automatically bring about an integrated theory of development. Furthermore, we believe that there should be theoretical debates even though two competing arguments might both be grounded on a nondualistic ontology.

Based on our commitment to phenomenology, we were not particularly interested in making absolute predictive conclusions and cause-and-effect propositions.

Accordingly, our analysis did not provide a theoretical-developmental account that perfectly lays out the unfolding of developmental sequences and accurately predicts the occurrence of developmental achievements. Instead, we focused on showing how the structures of the infant’s relationship to her body, objects, and others, evolve over time during the first year, in a meaningful way. For example, whereas our lengthy discussion of the ontological implications of neonatal facial and emotional imitation highlights their relevance to the infants’ social development, we have no intention to integrate the imitative mechanism into a learning theory or a developmental theory of selfhood (e.g., Stern, 1986; Merleau-Ponty, 1964) because it is not a major purpose of this project.

From our point of view, the invention of an integrated theoretical account of development, regardless of its founding ontology, would inevitably sacrifice the

complexity and vicissitude of human existence—from the dimensions of culture, language, symbols, and social structures, to the relevance of neurological maturation, interpersonal experience, and existential concerns. Hence, we have purposefully limited my participation in developmental theorizing. When theorizing takes place in this project, we seek to stay in close contact with the empirical observations.

In conclusion, beyond the direct findings and conclusions of the current investigation, this project also aims to making some broader contributions in two dimensions: methodological and ontological. From a methodological standpoint, this project is an extensive demonstration of how to approach experimental research records from a phenomenological-hermeneutic perspective that highlights the circular relation between ontology, epistemology, and theory.

This approach can enrich our understanding of experimental studies in several ways. First, it guides us to look at research experiments in fully-contextualized terms as a unique spatio-temporal unfolding of events. Second, it shows that experimental setups and procedures could not be understood without recognition of infant’s innate interests, inclinations, motility, affective experience, and manners of embodied coping. Lastly, it also calls for our critical attention to the details (minor variations) of the experimental paradigms, designs, and procedures in accounting for the research outcomes.

Particularly, our phenomenological reflection on the “violation-of-expectancy” and “habituation/ dishabituation” paradigms has provided two valuable methodological implications. First, it offers an empirical ground for making sense of the variable outcomes across similar studies due to minor alterations in experimental conditions, setups, and procedures. Second, it illustrates the importance of being critical and

somewhat suspicious about the ecological relevance of the experimental situations—whether or not they are representative of human natural habitat. In our opinion, these demonstrations can serve as an inspiration for future scholars who aspire to explore the fullness and complexity of experimental research in any areas of psychology.

From an ontological point of view, this project reveals the importance of ontological dialogues in infant psychology. Our rigorous phenomenological-hermeneutic analysis has shown that all theoretical interpretations and conceptual accounts presuppose some ontological assumptions, exposing their potential problems at the logical, inferential, and philosophical levels. Even though our investigation is clearly founded upon a very specific version of nondualistic ontology (Merleau-Ponty, 1962, 1964, 1968), we would contend that one of the broader contributions of this project is the promotion of a reflective, intellectually-stimulating dialogue about ontological thoughts within psychology, dualistic or nondualistic, Cartesian or post-Cartesian. Such dialogue certainly exists in the field of philosophy, but we are inspired to keep pushing it into the territory of psychology and grounding it on an empirical pool of experimental findings.

Furthermore, given the indwelling presence of Cartesian dualism in psychological literatures, we believe that any nondualistic explications of psychological research can benefit from further revision and refinement through an ongoing dialogue. Finally, for the scholars who might find wisdom in the nondualistic ontology proposed by Merleau-Ponty, we hope that our investigation would further push forward an ongoing effort to justify its validity on empirical and scientific grounds. Future investigations like this should involve continuing efforts to reexamine up-to-date cutting-edge experimental

research, and to monitor the increasingly-complex evolution of dualistic thoughts that prevail in the literature.

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