

Babies interacting with technical objects and the individuation process

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Abstract: The article explores how babies interact with technical objects of increasing complexity. The theoretical framework deals with touch and prospective convergence between objects and subjects. In this article, the research question is: how do babies interact with objects of increasing technological complexity, activating a material dimension at the service of their individuation? Observations were carried out in France and Brazil, either in daycare centres or in families' homes with babies. A non-anthropocentric methodology is proposed - linking the body-environment system. Some episodes will be presented to show how babies activate the material dimension at the service of their individuation, highlighting the impossibility of separating the individual-environment.

Keywords: Baby Studies. Materiality. Individuation process. Environment.

Interação de bebês com objetos técnicos e processos de individuação

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Resumo: O artigo explora como os bebês interagem com objetos técnicos de complexidade crescente. O referencial teórico trata do toque e da convergência prospectiva entre objetos e sujeitos. Neste artigo, a questão de pesquisa é: como os bebês interagem com objetos de crescente complexidade tecnológica, ativando uma dimensão material a serviço de sua individuação? Observações foram realizadas na França e no Brasil em creches e em residências de famílias com bebês. É proposta uma metodologia não antropocêntrica - ligando o sistema corpo-ambiente. Alguns episódios serão apresentados para evidenciar como os bebês ativam a dimensão material a serviço de sua individuação, destacando a impossibilidade de separar indivíduo-ambiente.

Palavras-chave: Estudos de bebês. Materialidade. Processo de individuação. Ambiente.

Interacción de bebés con objetos técnicos y proceso de individuación

Resumen: El artículo explora cómo los bebés interactúan con objetos técnicos de complejidad creciente. La teórica trata sobre el tacto y la convergencia prospectiva entre objetos y sujetos. En este artículo, la pregunta de investigación es: ¿cómo interactúan los bebés con objetos de creciente complejidad tecnológica, activando una dimensión material al servicio de su individuación? Las observaciones se realizaron en Francia y Brasil, tanto en guarderías como en hogares de familias con bebés. Se propone una metodología no antropocéntrica que vincula el sistema cuerpo-ambiente. Se presentarán al programa algunos episodios de cómo los bebés activan la dimensión material al servicio de su individuación, destacando la imposibilidad de separar individuo-entorno.

Palabras clave: Estudios de bebés. Materialidad. Proceso de individuación. Medio ambiente.

1. Introduction

The study focuses on babies' interaction experiences with increasingly complex technical objects. The purpose of this article is to explore how infants activate the understanding of an object by activating a material dimension at the service of their individuation (SIMONDON, 1989) – a theory that highlights the impossibility of separating the individual-environment dual, closely interconnected as clay brick and the mould that shaped it.

Technical objects and technology are part of very young babies' lives. However, how they interact with it is still an area under

exploration. The embodiment (e.g., CHEVILLE, 2006; DOURISH, 2004) and new material perspective (LENZ TAGUCHI; PALMER, 2014) can help understand babies and children's relationship with materiality, including body and artefacts (IMPEDOVO et al. 2015, ORRMALM, 2020). More, it has become increasingly important to understand how new digital devices create new cultural conditions for babies' (and children) development (FLEER, 2019). Digital technology in early childhood education has inadvertently been theorised as a binary between the digital tool and the non-digital activity, despite concerns expressed and attempts to name new practices (GILLEN; KUCIRKOVA, 2018). Considering this, in this paper, the research question is about how infants interact with objects of increasing technological complexity by activating a material dimension at the service of their individuation? The research question and the data analysis was performed in a joint commitment and interests by a French and Brazilian agreement. Indeed, this paper results from a research agreement in which research scholar (the second author) came to Brazil to co-work with Gabriela Tebet group in the Scopus of project FAPESP 15/10731-8 – "Babies, individuation, subjectivation and singularisation process experienced by them in different spaces" and FAPESP 18/26635-6 – "Between individuation and materiality: analysis of babies and young children experiences with objects".

As an illustrative example to support the reflection, fieldwork was carried out in France and Brazil.

1.1 Technical Object and Technology: touching the materiality

In today's complex and increasingly technological society, it has become increasingly important to understand how new digital devices create new cultural conditions for babies and children's development (FLEER, 2019). With the current rapid technological development, babies are confronted with new technical influences, affordances and possible development. The babies learn and, at the same time, structure themselves through the environment:

The newborn cannot distinguish between himself and his environment; slowly, specific areas, for instance, those connected with eating, take on a specific character, became more and more differentiated; the parts of his own body became differentiated from each other, and the rest of the world; social relations develop and became differentiated; needs, emotions, language go through a similar process of differentiation (LEWIN, 1942, p. 226).

One modality that the babies use to explore the environment and discover the “Other-that-me” is touch. All of us have the experiences of the baby’s hand moving around, also if the body is calm and fixed. Touching is a concept developed in philosophy, like Merleau-Ponty (1962). According to the philosopher Nancy (2008), touching is a sensation and a feeling. This contact reduces the distances of the “between”: the information is transmitted into the act of touching interaction, translating sensation into meanings.

1.2 Babies and individuation process

As a possible convergent perspective between materiality and development, we present Simondon’s (1989) main ideas, which we consider appropriate to describe the process of the baby developing in interaction with materiality.

In the theory of the French philosopher Gilbert Simondon, the individual is only a phase of being, that is, the moment of a process of transformation that passes through different stages and different charges of “potentials.” The individual is a “phase” whose dimension is becoming and whose state is in metastable tension because it is loaded with potentials.

Individuation brings out the individual and the individual-environment couple and focuses on the process. Thus, the individual is relative in two senses: it does not constitute the whole being or results from a state of being. There was neither an individual nor a principle of individuation. For Simondon, it consists of the impossibility of separating the individual from his environment

since it is simply impossible outside of this relationship. In his example, the production of a brick is not a synthesis of two opposing and distinct elements since the form is always already implicated in the refinement of the clay, and the clay is always already involved in the mould. So, he conceives brick-making as a meeting between two 'heterogeneous domains', which 'institute a mediation, as two converging series of becoming. The environment or milieu is not simply the stage or place in which individuation/communication occurs: like the brick and the clay-mould relation, the individuated being and environment are always paired. At the same time, the milieu itself also becomes into being as it is associated with the individual being. Both identifications, psychic and collective, are reciprocal; they allow defining the category of the trans-individual, which aims to account for the systematic unity of internal (psychic) individuation and external (collective) identification. Concerning the individuation processes described by Simondon, it is possible to understand that the human being individuates in vital, psychic and trans-individual modes. Inserted in society, in his relationship and with the environment, he started to individuate the elements of nature, creating objects, some of them being machines, tools and utensils. Such considerations about the human relationship with objects can be analysed from the Simondonian complementary thesis, especially in the chapter dedicated to the fundamental ways of relating the human being to a technical object. Initially, it is necessary to clarify that, according to Simondon, the technical world is the collective world, which is not correctly thought of either from the gross social or the psychic (SIMONDON, 2020b, p. 367). In this way, the technique is considered a dimension of the human world.

Technical activity is not part of the purely social realm or the pure psychic realm. The collaborative relationship model cannot be confused with one of the two preceding relationships (SIMONDON, 2020b, p. 356).

In this perspective, it is evident that the collective group is inseparable from the technical activity. Thus, it is possible to reflect on how Early Childhood Education and Care (ECEC) corresponds to a collective in which numerous techniques are present in all its segments (kitchen, cleaning, administrative sector and reference rooms) and involve all adults, children and babies. Every day, in early childhood education and care context, babies are instructed to master specific techniques, that is, to handle particular objects uniquely. This can be seen in manipulating balls, teddy bears, dolls, toy cars, musical toys and stationery materials (pencils, paper, gouache paint, etc.). In addition, adults dictate how babies should use other objects, such as rocking chairs, mattresses, spoons, plates and cups. The genesis of the technical object is understood from the studies by Simondon (2020b, p. 55) that these do not necessarily need to be included in a technical species. In this context, objects do not have specificities so that the same result can be obtained from different functions and structures:

The use brings together structures and heterogeneous functioning under genera and species that extract their meaning from the relationship between these functioning and another – the functioning of the human being in action (SIMONDON, 2020b, p. 55).

The passage above helps understand that objects do not need to have only one function. Simondon states that the uses for technical objects can be unlimited, and the more complex the structure of this object, the greater the expansion of its functioning possibilities.

Each part is no longer just whose essence is to perform a function desired by the builder in the concrete object. Still, part of a system in which a multiplicity of forces is exerted and effects are produced that do not depend on the intention of those who manufactured it (SIMONDON, 2020b, p. 76).

In another passage, we understand from Simondon that a fully automatic machine, completely closed in on itself in a predetermined operation, could only provide reduced results (SIMONDON, 2018, p. 71). That said, we can extend this discussion beyond machines, as other objects have functions that are entirely closed on themselves, such as the objects mentioned above that are part of the daycare context. In addition, Simondon (2018, p. 23) adds that “technical species are much more restricted in number than the uses to which we put technical objects” because human needs are very diverse. It should not limit the actions that could be performed on the objects. However, we can reflect on how babies handle such objects, and the scenes in this article will reveal that they do not limit how objects can be used.

1.3 Touching Technical Objects for Individuation

As previously stated, the daycare centre is situated in the context of the collective, which we can name, based on Simondon's studies, as the trans-individual. To understand the processes of psychic and collective individuation highlighted by Simondon, it is necessary to emphasise that the entry into the psychic reality is an entry into a transitory path, as the resolution of the intra-individual psychic problem (perception and affectivity) leads to the level of the trans-individual. According to the author, psychic life moves from the pre-individual to the collective.

The psychic being is the being that fulfils the functions of individuation as completely as possible without limiting individuation to the first stage of the vital; it resolves the disparity of its internal problem insofar as it participates in the individuation of the collective. This collective, trans-individual reality obtained by individuating pre-individual realities associated with a plurality of living beings is distinguished from the purely social and the pure inter-individual (SIMONDON, 2005, p. 244).

Based on these considerations, it is possible to understand the relationships between collective, trans-individual and pre-individual. In the context of Early Childhood Education and Care, we have the baby immersed in a collective manifesting their disparities, given their pre-individual reality load, which is very intense. From another perspective, we understand through Simondon that the individual's engagement in society tends to fulfil predetermined functions, which cannot be different:

[...] the individual sees himself proposing scopes, roles to be chosen; he must tend to these roles, to types, to images, to be guided by structures he strives to realise, coming to terms with and fulfilling them; facing the individual being, society presents a network of states and roles through which individual conduct must pass (SIMONDON, 2020, p. 436).

In the same way, the individual sees himself fulfilling fixed structures, the way he relates to objects is also very determined. On the other hand, babies tend to follow their behaviours, which are not fixed, regardless of adults' instructions. The baby's intense pre-individual reality charge makes his intuition more fluid and his actions more spontaneous and indeterminate. Thus, if babies' behaviour encompasses the field of possibilities, the handling of objects will be the same way.

2 The Study

In this paper, the research question is: how do babies interact with objects of increasing technological complexity by activating a material dimension at the service of their individuation?

2.1 The context

This research follows a preview project⁴ and publications (IMPEDOVO; TEBET, 2019; TEBET; IMPEDOVO; PONTES, 2021), which focused on boundaries and how to improve the quality of development of infants in the daily technical environment around them.

France and Brazil present a wide variability of services for babies and children. From the age of two and a half months in France and four months in Brazil up to three years old in both countries, an infant can access a nursery - named “*crèche*” in France and “*creche*” in Brazil or “Early Childhood Education and Care Centers” (ECEC). The French data presented in this article come from a single French nursery, which we will call here with an invented name “Luna”, located in a residential area in the center of the metropolis. Three videotaped sessions were conducted in this *crèche* for a total of nine hours. For data collection in Brazil, video recordings were used, conducted as part of a research project proposed by Tebet. In particular, the video data and pictures used for the analysis comes from two families participants in the research. All the implications of the study, the research modality, the access to the facilities and the video recording of the data have been extensively discussed with the managers of each facility and authorised by the families with a signed written consent to ensure maximum transparency and following ethical guides of each country.

3 Data collection and Data Analysis

Our primary data were the video recordings; the other data sources like written notes and personal annotation were used to clarify and enrich our interpretation of the videos. The primary data

⁴ FAPESP 15/10731-8 – “Os bebês e os processos de individuação, subjetivação e singularização vividos por eles em distintos espaços” and FAPESP 18/26635-6 - “Entre individuação e materialidade: análise de experiências de bebês e crianças pequenas com objetos”.

were catalogued (HEATH, HINDMARSH; LUFF, 2010). A non-anthropocentric methodology (HULTMAN; LENZ TAGUCHI, 2010) is adopted. The indicators considered are the embodied and the linguistic exchange, considering socio-material dimensions of the exchange. Main topical episodes will be presented (LINELL, 2009) as an illustration.

3.1 Daylife objects

The importance of looking for relations babies establish with objects have been highlighted by many scholars (WINNICOTT, 1986; IMPEDOVO; TEBET, 2019; ORRMALL, 2020). This section shares two episodes observed in two babies' day lives.

3.1.1 *The shoes and the chair*⁵

In May 2019, the family "Sun" decided to bring his baby of 6 months to the daycare. Sun (an invented name for this baby) explored his shoes while on his father's laps (Figure 1a). During the morning, after a tour in the first visited daycare, the family, the researcher, and the baby was at the reception. The coordinator talked about the pedagogical proposal and values.

After the visit to this first ECEC, the group lunched and waited to go to the second daycare in the afternoon. During lunchtime, the baby interacted with objects in the restaurant, with his mother, father, and researcher. In the second daycare visit, the baby was sleeping when he arrived and, after the tour in the daycare with Sun in his mum's arms, the coordinator suggested putting "Sun" in a baby chair in the reception room while they were starting a talk about the pedagogical proposal and values, what was done. After some time, Sun woke up, looked around, and explored his shoes again. He spent some time with his shoes, and during this exploration, he took the shoes from his foot and let

⁵ Episode collected by Gabriela Tebet in 2019.

the shoes to his mouth. The researcher pointed to his mother what was happening, and the father said there was no problem since the shoes were new and clean. After some time, the baby dropped the shoe and then turned lying over on his stomach. So, doing this, he discovered the chair on where he was, its animal prints, and he found a ladybug and a bee print that caught his attention. It was necessary to move him from the chair to the floor, from where he could continue exploring the chair, but in a safer position, since the planned use for this kind of chair is if the baby remained on their back and not on their stomach (Figures 1 a, b, c, d, e).

Figure 1. The shoes and the chair



Source: Field Research, Gabriela Tebet's Field notes and Pictures, 2019

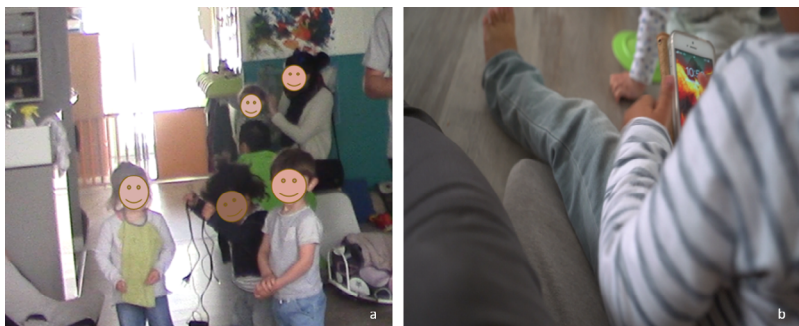
3.2 Technological objects

The Everyday life of babies and young children are also full of technological objects. Besides, many of them were not specifically designed for babies; they also interact with the technology around them, as state De Grande (2016), Ormall (2020) and as we will present below.

3.2.1 Smartphone⁶

In this episode, the researcher is filming the students' entrance into the crèche with the camera. Cell phones are forbidden in kindergarten. Therefore, the researcher also left her cell phone at the entrance to a bag and other technical material, such as the charging cables in the room. Suddenly one of the girls appears with the camera cables in her hand, having gone to rummage in the bag. Infants become excited by realising that they have done something forbidden. The educators smile and, at the same time, inform the 3-year-old girl to leave the cables. She leaves him but another object she manages to conquer, namely the cell phone, which she manages to hold firmly in her hands and begins to manipulate the access code to enter. The little girl seems familiar with her cell phone and amused by the opportunity to explore it. The researcher sits next to her to suggest she do something else and leave her cellphone.

Figure 2. Discovering the objects



Source: Field Research, Maria Antonieta's Field notes and Pictures, 2019

⁶ Episode collected by Maria Antonieta Impedovo in 2019.

4 Discussion

Retaking the metaphor of the brick and the clay-mould relation proposed by Simondon (1989), the milieu itself is transformed, adapted, and changed. Overcome a duality as human and non-human actors, “there are only natures-cultures” (LATOURET, 1993, p. 104) in a continuous negotiation. In the same inter-connected perspective, we can think there are no beings isolated, as a finished thing, but just beings-materials-spaces in a continuous negotiation and joint production. And babies are part of this negotiation and agents in their individuation processes while interacting with technical objects and redefining space, as highlighted by Orrmall (2020).

The author also affirms that “attention to the babies’ practices opens up opportunities for other ways of thinking about how the multiplicity of things comes to matter in babies’ everyday lives” (ORRMALL, 2020, p.10). So, from this approach and from observing relations among some babies and technical objects, we can develop some ideas about simultaneously babies’ psychic and collective individuation and the production of space.

We can find the three typologies of dimensions (technical, creative, affective) in each episode from the scenes above.

1. Technical material touching of the objects where the understanding of the use of the object is dominant.

2. Creative material touching the objects where the babies use the object in an alternative, new and not preventable use.

3. Affective material touching of the objects: an exploration of technical objects linked with an affective charge from the babies.

All of these dimensions in babies-technical objects relation simultaneously contribute to Babies’ individuation and space production. About the everyday objects, it is impressive the number of objects that babies are confronted with so that we can talk of flow (ORRMALL, 2020). All the technical objects are carried technical expertise embedded. Indeed, technical objects are considered everything that has transformed (IMPEDOVÓ et al., 2015), bringing a technique. Specifically, Rabardel defines

technical objects as “anything that has transformed human origin (...), which is ready to be used, developed to be part of finalised activities” (1995, p. 59).

As discussed earlier, Simondon (2020b) argues about the differentiation between function and functioning of objects and states that these can have a diversity of effects when handled by humans. Analysing specifically the scene “The shoes and the chair”, we can evidence how the baby relates to these objects, mainly when taking the shoe to the mouth (Figure 1.c), and when leaning on the rocking chair (Figure 1.e). However, as we stated earlier, the actions on such objects are restricted, as they have a particular function, exemplified in our scene: shoes and rocking chairs.

In the eyes of the adult, the function of shoes and rocking chairs are reduced to “putting on” and “sitting”, and this can be evidenced in the first scenes presented, where the baby was placed in the rocking chair. However, when the baby could explore the objects alone, he attributed other functions to them, such as taking the shoe to his mouth and leaning new movements and exploring the images on the rocking chair. This shows how much the baby is not limited to the specific function of the object, in addition to attributing to objects the handling of unlimited ways. This is a result of his intense pre-individual condition.

In an analysis of the transindividual, Simondon (2020a, p. 451) describes that all individuals keep the pre-individual with them, in addition to having “a kind of unstructured background from which a new individuation can be produced”. In this way, Simondon expresses that the individuated being carries with it a possible future of relational meanings to be discovered, which is the aforementioned pre-individual reality. “This pre-individual reality can be called nature, nature being the reality of the possible” (SIMONDON, 2020a, p. 455).

In this way, it is understood that the fewer individuations the individual has experienced, the closer he is to his nature and, therefore, the greater is his pre-individual reality charge. That is why babies have their field of possibilities expanded. This

reflects not only their relationship with themselves and with other individuals but also with the objects in their surroundings.

About the Technological objects, we can see how today's touch technologies provide an authentic form of embodied experience against the visualise paradigm (PARISI, 2020). The evolution of technologies gradually shaped the interaction between humans and computers (DOURISH, 2004): so, the exchange becomes an embodied interaction. The notion of interface refers to translation operations, bringing heterogeneous environments into contact.

As in the previous scene, the "Smartphone" scene shows different forms of relationship with objects, such as when the baby explores the charging cables and the phone itself. In this scene, it is possible to analyse the adult's expectations and the children's possibilities regarding the handling of objects. Again, we see that adults propose predetermined functions to objects, which often exclude babies from exploring them.

Would babies use cables and telephones in the same way as adults? If there was the possibility for the baby to handle such technological objects, what uses would they attribute to them? Scene A in Figure 2 shows a "different than conventional" operation for the charging cables, as the baby suspends these objects instead of plugging them into the "proper" places.

And what can the two analysed scenes help in the contribution of studies on the development of babies? First, it would be necessary to return to the idea of development and what this implies in the individuation processes of babies. Thinking about development, or evolution, would be the same as thinking about fixed and predetermined ways of being and handling objects: it is the same as barring the infinite possibilities; it is the same as distancing the being from its pre-individual reality.

Individuation processes have improved individuals in the same way that the constant exploration of objects makes possible new and infinite ways of handling them. However, what happens is that the more we move away from "being a baby", the more we are faced with fixed ways of thinking, being and structures. In this perspective, we agree again with Simondon when he states that

the closer we get to society, the more we tend to make agreements, scopes, roles and states in our conduct.

In general, we can consider that Knowledge is acquired through a semiotic mediation: objects are not only physical entities but social entities that are introduced to infants by adults as topics of reference and as entities with conventional uses.

In an adult-centred social model in which rules the pattern of language, children and infants are out of the “norm,” representing only “developing,” still “incomplete” subjects. Although babies are usually incorporated in the same analytical category as children, a specific area for infant reflections is needed, which can dialogue, approach, and distance from the sociology of childhood, especially with the massive introduction of technology in the daily life niche. This work is included in the line of “Baby Studies” (or Infantology) as a specific field of research aimed to improve the quality of education (OECD, 2001) since the first months of life in the *crèche*.

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