

Chapter 5

The Digital Play Experience Taxonomy (DPET): Mapping and Categorising the Digital Play Experience

In this chapter I follow-up the analysis and discussion of the theoretical codes presented on Chapter 4, and dwell on each code and the questions they inform in relation to the relevant literature earlier presented in Chapter 3. However, these codes are re-formulated together with the empirical data in order to build the arguments in this chapter.

5.1. Why Tablet Play and Not Tablet Use

Throughout the observations, data coding and analysis, the data geared towards a clear aspect: children's interactions with tablets are playful and children identify their use as playing. Even children who were trying tablet devices for the first time appeared to enjoy the activity while exploring and trying things, and when asked if and why they liked tablets, their responses were almost unanimously the same: It is fun! The fun aspect composes one of the many play characteristics, and this aspect surfaced as early as during the pilot observations and re-occurred in both Denmark and Japan during the first and second phases of the data collection. Thus, I acknowledge play as the core experience in young children's practices with tablets.

Key aspects of play theories build a valuable spectrum of young children's encounters with digital technologies together with theories of digital literacy practices, STS and experience. Therefore, when summing up the analysis of these interactions into a taxonomy, which I understand as a way of organising things systematically into groups, I specifically call it the taxonomy of tablet play and not of tablet use. I also allow myself the freedom to play with play-related terms, such as toys, calling the tablet a *toyblet* in the case of this age group. The reason for this wordplay is explained in the previous analysis, but in short, I identify tablets as playful multimodal toys. The proposed taxonomy describes the overall interactions that shape and define the types of play witnessed in digital contexts (Jackie Marsh & Bishop, 2013; Marsh et al., 2016; Plowman & Stephen, 2014).

As the coding process advanced and key patterns emerged, several aspects struck me as important. For example, observing the ways children interact (and learn to interact) with the tablet interfaces made me wonder how they become acquainted with game narratives and a wide-ranging iconography and its meanings; and how

children explore the spaces available in the digital interface. These thoughts fed into several questions and perspectives relating to existing theories.

During the final coding stage, I identified topic clusters and grouped the previously presented theoretical codes (Chapter 4) formulating an initial taxonomy of tablet play or a digital play experience taxonomy. In this taxonomy, I have identified and defined the group of young children's interactions while playing with tablets. This taxonomy was then revised after the final rounds of data collection analysis and is presented in the following subsection. The reason for defining a taxonomy was to group aspects of tablet play that intersected with each other and to facilitate an overview of aspects encountered in young children's digital play practices.

Creating a taxonomy, which was an effort to synthesise the findings while not losing their breadth, also aided me in focusing on the three main theoretical fields presented earlier. Moreover, analysing the theoretical codes through the taxonomy categories exposes the overall process of organising and interlinking the findings into meaningful categories that define digital play practices. In the following sections, I present each of the taxonomy categories through the theoretical codes. In each category section, I analyse and discuss the theoretical codes supported by some of the literature and context discussion introduced in Chapter 3. Additionally, I offer reflections on these codes and categories, building the argument towards my theoretical contribution.

5.2. Taxonomy of Tablet Play or The Digital Play Experience Taxonomy

The proposed taxonomy is composed of five key categories: *vocabulary*, *design*, *play*, *interaction* and *attachment*. The taxonomy is grounded on how the theoretical codes address the research questions raised in the early rounds of the research process (see Chapter 3) and each of the categories is explained and exemplified below. Besides addressing the research questions, the taxonomy expands them further into broader arenas. For example, the categories of play, interaction and attachment intersect through distinct angles with the motivation and engagement codes. The tablet vocabulary and design categories are both central for defining current and future interactions with similar future devices. Clearly, competences and skills are being developed, such as problem-solving, dexterity and learning a range of symbols and their functionalities, but I suggest that the whole of the play experience with digital devices reaches beyond these competences.

5.2.1. Vocabulary

Vocabulary: refers to the verbal, physical and semiotic vocabulary being shaped and developed through tablet play.

Theoretical codes: language, semiotic knowledge, literacies, identity/digital narratives, multimodality, cultural aspects, problem-solving.

The vocabulary category comprises seven theoretical codes. These codes intersect in a common thread in children's tablet play that relates to ways of

speaking about and seeing the interactions and engaging with spaces and activities in the devices. These aspects form the vocabulary category and are further analysed in the following paragraphs.

As tablets are used, it becomes clear that there is a lack of term differentiation when young children refer to activities on the device. The findings show that from the children observed, the vast majority called all types of apps 'games' (*Spil* eller *Gemu* ゲーム) and any activity, 'playing apps'. The preferred verbs used were *spille*, in Denmark and *suru*, in Japan. It also became apparent during the observations in both countries that there was a lack of a defined term when indicating an activity, e.g., does one swipe the screen to another 'page', 'section' or 'area'? When within apps, this choice of word was sometimes facilitated as the term 'page' fits very well in the case of a book-reading app, or the term 'level' in games. Also, terms such as 'menu', 'back' or 'home' were commonly applied, but as I did not further investigate this specific vocabulary, I cannot say if these words are used as synonyms or whether children perceive them differently. However, there is not a unified and commonly used term for these 'spaces' or 'areas' on tablet devices.

A second aspect belonging to the vocabulary category relates to what the interaction (or play) is called, and how it is described and framed by older siblings, parents and institution's pedagogues. What children call the apps and how they describe them is inherited from parents, siblings, friends, TV shows, and shaped through social and cultural descriptions. Therefore, the way parents use terms such as 'games' or 'apps', might frame how children verbalise their own tablet experience. When talking to pedagogues and parents, I witnessed similarities in the choice of words regarding activities on tablets. However, the talks and interviews I had with these adults were only intended to contextualise children's environments. To find out how 'top-down' mediation affects the emergence of an original vocabulary from the children's side would require further investigation.

A third aspect of the tablet vocabulary category refers to distinct states and meanings within the digital universe, e.g., a definition of the visible 'things' that are inaccessible. It is possible to make a quick comparison metaphor to physical retail, where objects in shops are visible and available for purchase. However, in the digital context of apps, children found themselves uncertain of the interaction, trying to tap and drag non-interactive images and icons. By trying non-interactive icons, children start gaining knowledge of digital symbols informing their states, i.e., a lock next to the image or a faded colour means they are not available. These interactions slowly build the creation and development of a semiotic vocabulary, as children who appeared to be well acquainted with an app or with tablets, in general, were less likely to try interacting with locked items, loading images or non-interactive symbols.

When assigning empirical evidence to the codes of language, semiotics and multimodality, it became apparent that there was more than that which met the eye while children played with tablets. Children were in a process of discovery, experimentation and learning. However, these aspects do not necessarily inform whether children are able to read and write earlier or later (as this was not part of my study). Instead, the data revealed a range of competences being acquired

and developed through these tablet interactions, feeding into the perceptions of what it means to be digitally literate as a young child.

I observed similar competences to those described by Marsh et al. (2015) in their UK research with children between 0–5 years of age, such as dragging items, using apps, swiping the screen, using creativity apps, taking pictures and turning on the device. Beyond these, I also identified ways children described their play and how they played. Consequently, as children became acquainted with the available app environment I had curated, they tried unknown apps and discovered or created their own app narrative while playing them.

Children sometimes asked how to play something while already playing it. Other times they verbalised what they thought the app was about by saying what they believed it required or they described to their peers what they were doing ('linking the red dots', 'moving the balls', 'taking him there'). This also aligns with Marsh et al. (ibid.) as they highlight in their report that one of their subjects, a parent, mentions how her child talks while playing, describing what she is doing on the app. This way of engaging with the device by talking while experimenting and playing gives a small glimpse of how children use and develop their creativity, how they problem-solve and decipher the meanings of a number of images and their modes of interaction. For example, in the case of seeing an image of a tablet with an arrow inside indicating they have to tilt the device in order to pour the liquid into a jar, children tried 'holding the container' (see [Figure 5.1](#)), moving the container in the direction suggested, and eventually tried moving the actual tablet, finally deciphering that code. When it appeared subsequently, children immediately tilted the device, showing that they had learned the symbol and the interaction associated with it.

I propose that this form of play is also creating a multimodal body of knowledge (Marsh, 2010; Sefton-Green et al., 2016) that is constituted by physical competences combined with rich semiotic resources and practices. This also resonates with Schön (1987) and Ingold's 'thinking through making' (2013: xi). In this case, the *making* refers to engaging through physical actions with characters and spaces on the device, which are the material for 'weaving' or constructing the final product, the play experience.

The vocabulary also deals with how children relate to characters, settings and digital spaces when using the first person pronoun 'I' or using terms such as *there* and *here* while touching the screen and pointing at these locations. Moreover, by describing locations on the apps and what they are doing while playing using these personal and spatial terms, children show they have incorporated perceptions of digital spaces in their play and in their narratives. This way of describing and performing play agrees with those described by Winther-Lindqvist (2009), Ackermann (2013) and Fleer (2014) when discussing play as a multilateral activity where the real and imaginary overlap and are 'simultaneously about pretence and about the literally real' (Winther-Lindqvist, 2009, p. 63). However, in the case of digital play, the *pretence* or the digital environment guiding the play, as in the LEGO city or Talking Tom

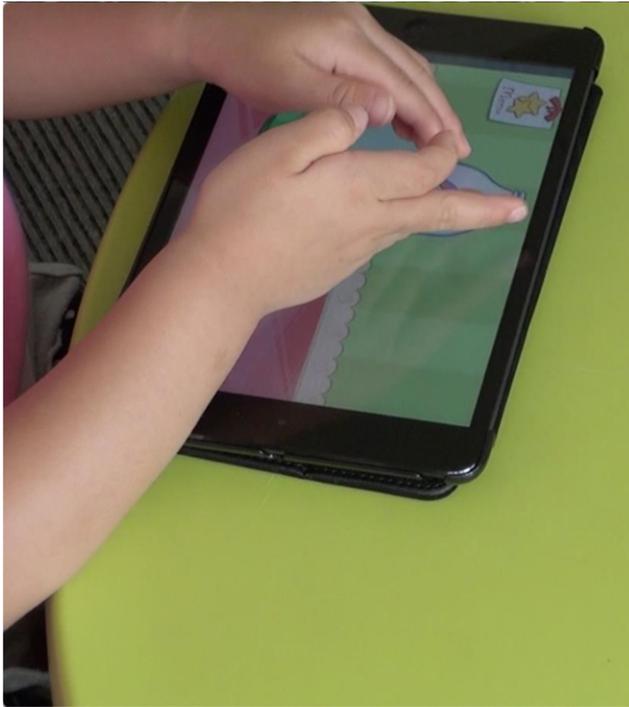


Figure 5.1. Holding the Bottle to Pour Liquid in the Bowl.

apps, is digitally real. They are not imaginary spaces; children are interacting with *existing* digital spaces.

Children's imagination expands these spaces by bridging them to their realities, such as saying 'I have to take him there' when referring to a rescue boat that needs to save a drowning character in a LEGO City app, by attributing personality traits to the device – as when saying 'I don't like when it (the tablet) teases me', or by self-referencing and identifying with the characters 'it's me' when seeing a little girl approaching the booth in the LEGO food app. In these examples, children interact with the tablet in creative manners by engaging with app scenarios distancing themselves from the physical rules – saying *there* to something you are touching, incorporating the perceptions of space offered by the app – while acknowledging their role in the game as the character 'needs' the child to move him/her from here to there.

Attributing a personality to the device¹ is also a way to build a relationship with the machine (this feeds into the attachment category presented later

¹Saying that the device teases closely agrees with the aspects presented by Turkle (1984) in her study with young children, where children discussed a computer toy (Merlin) 'cheating'.

in this chapter). In this discourse, the machine becomes *the other*, or something with a will of its own. A similar perception can be found in Sherry Turkle's (1984) early research on children and interactive toys, where children also attributed human behaviour to electronic toys. Children create and challenge the device's 'moods' by insisting and imposing what they want, hence the consecutive tapping and using pressure when the device does not obey. Another way of dealing with the *teaser* is distancing themselves from the teasing by just leaving the app to play with another one, and returning later to try the same app again.

In summary, through the choice of words and modes of play-related literacies, the vocabulary category covers a number of valuable aspects encountered in young children's tablet play language. Although the word *vocabulary* relates to spoken or vocal expressions, I find the term has grown beyond its definition and can be used in this described context to include a visual and touch vocabulary composing the DPET taxonomy vocabulary category.

5.2.2. *Design*

Design: refers to physical and digital interface aspects encountered in tablets – aspects that dictate or inform how to interact with the device. It also covers some of the current design limitations in existing platforms.

Theoretical codes: agency, branding, tablet semiotics, (design) expectations, design limitations, privacy, exploration, notions of space (digital), toy, multi-modalities and media literacies.

The design category is composed of 11 theoretical codes. These codes converge the physical and digital interface design characteristics of current tablet devices and the ways children appropriate these characteristics through their media use. The appropriation aspect within this category relates to ways in which children recognise, narrate and relate to their experiences with these types of technologies² (Dourish, 2006; McCarthy & Wright, 2004; Papert & Harel, 1991; Pink et al., 2015). The appropriation aspect intersects the theoretical codes of branding, agency, semiotics, exploration and notions of spaces. The design category is also presented and discussed through media and digital literacy theories (Buckingham, 2006, 2007a; Sefton-Green et al., 2016; Sonia Livingstone, 2004), which in this context refer to existing (and yet to be learned) design-related competences when interacting with the devices, for example, how, through trial and error, children learn to differentiate active and non-active icons and to create spaces by dragging icons to the side of the device. These competences shape and are shaped through the types and qualities of the interactions with tablets. Although these design-related literacies are not the outcome

²In the context of this research, I should say that when talking about these experiences, children referred to both tablets (parents', siblings' and their own) and smartphones (their parents' or siblings').

of a formal media education in children's preschools, these literacies are still obtained out of cultural, social and individual processes while engaging (playing) with these devices. Furthermore, in this design category, I acknowledge current limitations of tablet interfaces and suggest how these interfaces could evolve towards considering wider scenarios for children's interactions with tablets. These characteristics are presented and discussed in the following.

Children of this age group did not seem to understand the idea of an 'icon with no interaction', this illustrates the codes of semiotics and exploration that shape this design category. Every image was regarded as an interactive possibility, hence they tried to tap on loading images and various icons spread across the apps' interfaces. One example of the semiotic acquaintance was that children identified 'their' apps, or apps designed for children, with very few of the observed children tapping on other types of apps, such as the safari app or the calendar (both located on the first loaded screen as one opened the device).

Children would point at apps saying 'I know this', 'I have this at home' or 'I have this game in LEGO bricks' indicating that they recognise and are familiar with these apps. Looking for something they already knew and choosing known icons (and brands) when they did not necessarily recognise any of the loaded apps indicates how children map the tablet interface, plus the value of the familiar. Feeling comfortable in a known environment points towards a way of exploring – the known appears to be more valuable than the 'not known', which leads to both branding (the feeling of the familiar can relate to icons and shapes that are recognised as belonging to specific brands, such as LEGO or Angry Birds³) and semiotic awareness aspects encountered on tablet devices.

The feeling of the familiar linked to the iconography informs one of the ways of appropriating the narratives and therefore, the device, or how digital contexts relate to these children's personal experiences. This characteristic of adopting an experience by making it your own aligns with McCarthy and Wright (2004), who list it as one of the six processes of sense making 'in and of experience' with technology (2004, p. 124)⁴.

The children also appropriated the characters and designs, as for example saying 'it's me' pointing at a character and then creating the combination of ice

³I did not have the Angry Birds apps installed, but I did have Bad Piggies, which is designed by Rovio and has the pig characters from Angry Birds, which many children recognised.

⁴McCarthy and Wright (2004) in their book *Technology as Experience* present 'technology to be deeply embedded in everyday experience, in ways that are aesthetic and ethical as well as functional' (preface). They present six aspects which build the core process of current experiences with technologies: *anticipating, connecting, interpreting, reflecting, appropriating* and *recounting*. They exemplify how relationship to devices exists through a sensorial engagement. By appropriating a technology, children attach a significance to the whole of the experience beyond the just pragmatic use of the device and interface.



Figure 5.2. Making Ice Cream for People. In This Case a Giraffe, and the Child Creates an Ice Cream based on Own Taste (Not the One Requested by the Giraffe).

cream requested by this character when playing the LEGO food app; or by acknowledging their role in the game by saying ‘we have to make ice cream for people’ (see Figure 5.2). This role is dictated by the app design, and children participate in this role-play setting by being ‘there’ in the narrative, but not losing sight of the ‘here’, being aware of their peers in the room. Such an appropriation aspect aligns with other appropriation definitions. For example, when examining the topics of space and place in the context of technology experiences, Dourish (2006) discusses the role of appropriation and proposes:

The technologically mediated world does not stand apart from the physical world within which it is embedded; rather, it provides a new set of ways for that physical world to be understood and appropriated. Technological mediation supports and conditions the emergence of new cultural practices, not by creating a distinct sphere of practice but by opening up new forms of practice within the everyday world, reflecting and conditioning the emergence of new forms of environmental knowing. (Dourish, 2006, p. 6)

I suggest that, among young children, these ‘new forms of environmental knowing’ incorporate images and symbols from digital spaces and contexts, such as those encountered in tablet devices. These digital spaces are intertwined in the ways children describe their media experiences. They also inform a set of digital narratives that expand the digital play into physical play situations, as in the case of apps that have physical counterparts, such as LEGO.

The aspects of building on digital narratives of physical counterparts through tablet and app design interfaces, together with how these interfaces are appropriated, brings me to the theoretical code of ‘toy’. As described in Chapter 3, toys are culturally bound objects with a symbolic purpose, an agent of and for the imagination (Fleer, 2014; Marsh, 2010; Sicart, 2014; Sutton-Smith, 1986; Vygotsky, 1978). In the case of tablets, and due to their ubiquity in both societies observed, the object, the design, brands and apps join in creating a play symbol, which has become ‘universal’ in these realities.

Despite any differences these distinct cultures may portray, I would argue that in a children’s play universe, tablets have become a desired device. As a toy, tablets certainly bring children into an array of narratives and contexts, and fulfil their role of bridging fiction and reality (Fleer, 2014; Marsh, 2010; Sicart, 2014). Tablets offer enough material for children to be imaginative and creative as they explore some of the physical affordances of devices, such as reflections as well as app capabilities, by disrupting a game narrative and creating a game from the photo and camera utility functions.

Notwithstanding these creative assets and that the number of apps keeps increasing, app designs must still evolve in order to afford the growing creative inputs and expectations of children, such as being able to create an image in one app and import that image into another story or context. Current designs include a number of limitations. For example, one cannot create a LEGO ice cream and feed it into ‘Talking Tom’. Current (and older) computers allow for inter-app experiences with simple commands such as copy and paste; tablets, being newer devices, are many steps behind in this design aspect. For example, an image created in a drawing app on a computer can be imported into a text document, it can be animated in another app or it can just be printed, becoming a physical toy. However in tablet devices, this option remains highly limited, with even simple commands of copy and paste being unsuitable for images, drawings or icons; creating app silos where, despite the multimodal aspect of the device, limited cross-interaction occurs⁵. This design aspect also informs the expanding concept of digital toys. Whereas any physical toy can gain specific characteristics depending on the type and context of play taking place, on current apps, these characteristics are pre-defined and can rarely be changed, they vary from basic character personalities to set environments.

As an overarching reflection, digital scenarios, which could be seen as having maximum flexibility, are currently limited, since apps have very defined settings with limited or no possibilities for exchanges of their digital properties. If limitations such as these are overcome, the realm of creative possibilities expands, mixing other types of physical affordances into digital narratives. These limitations also currently constrain the available hardware and software multimodal

⁵It is possible to take screenshots and save them in the photo library, and some apps allow importing of material from the photo library. However, editing and sometimes even executing this ‘simple’ process can be cumbersome if the user is not well acquainted with this device capability.

affordances such as moving images, speech, writing, sounds and spaces (Gillen et al., 2010). As a consequence, the designs delimit the types of interactions children experience. After my observations and despite the heterogeneity in children's user knowledge, I believe a wider range of multimodal interaction could be explored and acquired together with the current modes available through further developments in the devices' systems and functionalities.

This imminent design evolution must also align with other aspects, such as those involving children's rights (Livingstone, 2014a) and media literacies. For example, the theoretical code of privacy emerged from the aspect that children hardly ever close the apps. Children go from one app to another simply by pressing the physical button to return to the areas where the apps are located. Thus, apps remain open in the background and there is nothing on the app itself that allows for them to be closed. Although children who are experienced in using tablets used 'x' symbols with little problem to close warnings, none of the children's apps used provided this possibility to close them. The user has to know a wider range of interactions in order to do a simple task, such as closing an app. Perhaps another obvious point is that children are not necessarily concerned about closing apps, since they are unaware of open apps harvesting data and what this means or what is happening in the background of the device. Therefore, together with learning to use a digital device, children should be informed about aspects of data being collected in the background while devices are in use. This data knowledge is one of the many aspects that should compose the media literacy skill set.

The data aspect points towards media literacy education and how small ways of interacting with the device require taught knowledge or a change in the design. Buckingham (2006) suggested that media literacy development involves a broad competence in relation to the widest range of media. So one way of dealing with these data scenarios might also lie in the design and policy making. Accessing and engaging with online devices is a children's right in our digital times (Livingstone, 2014a). Therefore, companies developing apps for children should engage with this scenario not only from a commercial perspective but also from a socially responsible one, where small design decisions could offer positive solutions. For example, apps could be designed to close after a small period of time running in the background, or this setting could at least be available for selection by the user. One requires no further instruction, whereas the other requires an awareness of the need to close the app and some instruction. Both would amend the current setting, where one needs to double tap on a physical button and slide apps up or down to close them, as in the case of the apple operating system (IOS) or the Android operating system.

Among the device limitations, besides the design constraints I have previously discussed, there are points relating to its actual physical affordances. For instance, with a doll you can dress it, cut its hair, or conversely, with a piece of paper you can fold it and make it into an animal. Although these physical characteristics are not necessarily the same on digital counterparts, tablets can be great sources of inspiration offering possibilities that exceed physical limitations. It is true that occasionally some of the physical actions happen by chance, such

as discovering that you can tear a piece of paper, or fighting for a doll and a limb comes off. Random aspects like these are less likely to happen physically with a digital device, but some of the digital responses can be as random as these physical affordances in the digital context. Therefore, tablets appear to work as a great source for narratives and creative inputs, as the more content, the richer the world around the children.

The design category covers ways children engage with current physical and digital tablet designs. Browsing for familiar icons, recognising children's apps and brands, combined with appropriating and expanding narratives, characters and spaces shapes the tablet as a commodity in the play sphere. However, this *toyblet* design is still in its infancy regarding how it should address a range of current system and interface limitations and how it can be further expanded and developed as a toy.

5.2.3. *Play*

Play: refers to how tablets have entered and become a dynamic playground, and how, through children's play practices, they evolve from device to toy, promoting playfulness and experimentation.

Theoretical codes: cultural aspects, (play and design) expectations, play experience, toys, problem-solving, engagement, fun, digital spaces, familiarity, curiosity, game literacy, literacies, agency.

The play category deals primarily with how classic aspects from play theories such as agency, fun, game literacy, role-playing, toys and problem-solving are manifested in digital play practices with tablets. Although all the categories are within the DPET taxonomy, the play category emerged like the other categories, as the one word that intersected aspects from within the theoretical codes dealing with valuable topics from scholarly play research.

The theoretical codes are discussed through the examples and the theories presented earlier in Chapter 3. The cultural aspects, experience, curiosity, fun and toy codes are linked to play theories (Fleer, 2014; Huizinga, 1949; Marsh, 2010; Sicart, 2014; Sutton-Smith, 2001) as they compose a wide frame for the way in which young children engage with tablets. The socio-cultural context shapes aspects of intertextuality and child consumption composing the familiarity and expectation codes (Buckingham, 2007b; Crescenzi et al., 2014; Marsh, 2014; Marsh & Bishop, 2013; Marshall, 2002; Ong, 1998; Sefton-Green et al., 2016). Finally, the topic of appropriation is revisited through how play narratives and game rules are experienced, intersecting the theoretical codes of agency, game literacy, literacies, digital spaces, engagement and problem-solving (Dourish, 2006; Gaines, 2006; Gee, 2003, 2015, Marsh, 2010, 2014; Pink et al., 2015; Seymour Papert & Harel, 1991; Thornton, 1995). A number of examples illustrate all these aspects and are presented in the following paragraphs.

Cultural aspects usually play a role in how play evolves and develops in a culture, or in Huizinga's perception, cultures emerge from play (Huizinga, 1949). According to Sicart (2014), play is the way we engage with the world around us.

Tablets, together with their apps and digital games, have entered the children's social, cultural and play contexts, and, as observed in both Japan and Denmark, interacting with tablets is a playful activity. Children recognised the devices and even children who had not necessarily used one before knew they could play on these devices and had a notion of how to do it (using their hands). The majority of children were keen to try the devices, with only three children out of 84 not showing much interest. In both Denmark and Japan, smartphones and tablets are highly pervasive in the public sphere and in home environments. Thus, children are exposed to these mobile devices from an early age. Besides the physical social sphere, tablets and mobile phones are also portrayed in cartoons, and a variety of narratives display these devices, making them a familiar item.

This familiarity transcends the devices; it also informs a way of interacting with their interfaces. Familiarity aspects are constructed through children's social and cultural exchanges (Crescenzi et al., 2014; Sefton-Green et al., 2016). Familiarity brings children into a comfort zone just like seeing a familiar face. When navigating digital spaces, a number of actors (Latour, 2005) construct this familiar space in the socio-cultural sphere in Denmark and Japan. For example, this familiarity ranges from children seeing their friends and parents using such devices, to doing some of these activities at home with their parents, siblings or friends, or knowing the characters from TV shows, toys, clothes, etc. This recognition aspect became a visible characteristic during the observations as children engaged with foreign⁶ devices. As described in the design category, children looked for known icons, symbols and certain apps based on their previous experiences with tablet devices. When they found one, they chose that instead of an unknown app, and children confirmed this choice many times themselves by saying: 'I have this app', or 'I have played this game'. The familiarity aspect then informs how the play unfolds with digital devices. The first part of the play was finding a known 'app'. This aspect might differ from its physical counterpart, as when children enter a room full of toys, they would not necessarily choose a toy they know. They might as well choose something they saw on TV but do not have, or even be attracted to something similar to something else that they might know. In both digital and physical cases, intertextuality (Marsh, 2014; Marshall, 2002; Ong, 1998) plays a part by leading to a known or recognised symbol. However, in the digital platforms, children appeared to be more careful, with almost no children jumping straight at the chance to play with the device with the first app they saw. A short phase of recognition and exploration frequently occurred before children chose to interact with an app; first they browsed through the areas on the device and the apps installed. Looking for the familiar also informs the perception of the child as an active consumer, deciding what to engage with and when, together with how children practice their agency when interacting with tablets (Buckingham, 2007a; Marsh & Bishop, 2013).

Despite the ubiquity of digital devices in daily narratives and the familiarity aspect that influences how children choose which app to interact with, the

⁶A device they do not own or that is not owned by their family.

children from the study did not have a strictly defined expectation of what they would encounter when being presented with an unfamiliar device (there were other types of play expectations which will be described later). Children knew they had to swipe to interact with the screen, but the content available and what was expected from within the different apps came as a bonus. Children explored the interfaces through breaking them down into small problems to be solved. During the observations, some children appeared to reflect on the interfaces, strategies and narratives of the apps by briefly reflecting aloud while engaging with them. For example, after playing for a few minutes with a match-the-dot app (Match The Dots), one child started to talk, saying that the game was about matching the red dots together. The child articulated her understanding of the game while playing and not necessarily addressing me, but almost as a self-reflection on the interaction. Added to this thinking aloud, she played with this app with the device in an upside down position, which did not seem to affect the play nor the fun she had playing with it. I coded this reflection as a problem-solving aspect. These utterances were encountered many times during the observations, both when children played individually, and when they played in groups where they made similar reflections while talking with their peers.

Another related example occurred when children played by making different combinations in the Bad Piggies app (Figure 5.3), where one has to first put together a cart in order to run along a path afterwards. Children were curious to experiment with creating various combinations of these carts, having fun seeing the carts collapse and fail, many times in funny ways. Although they wanted to get it right when they first started playing the game, the failed attempts seemed so funny (children laughed out loud when the cart began to dismantle and collapse

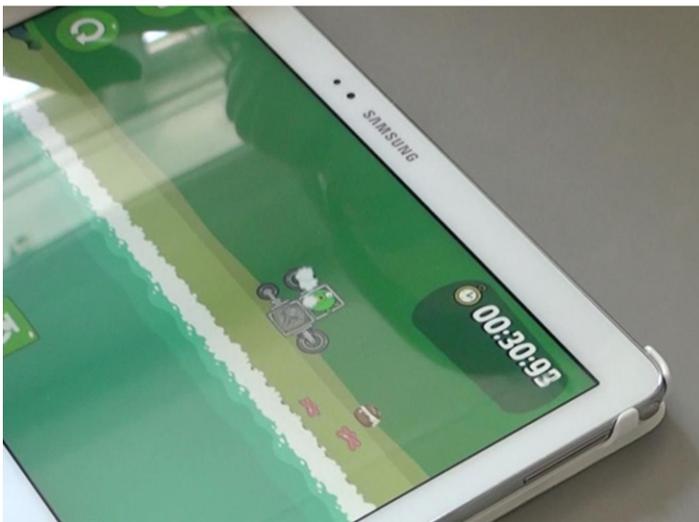


Figure 5.3. Playing with the Vehicle Possibilities.

with all the pieces flying around) that the children chose to continue doing wacky combinations to see more carts collapse. In this 'collapsed cart' case, children problem-solved to succeed in having fun, instead of succeeding in the game.

These examples indicate how fun and curiosity lead to distinct patterns of digital play, which distinguish themselves from those dictated by the app. Both cases also align with Thornton's perception of problem-solving, regarded an innate characteristic of children from a very early age (Thornton, 1995).

These problem-solving examples also illustrate how young children practice their agency (Marsh, 2010, 2014) over the designed interaction. Some apps, such as the LEGO Food or Bad Piggies, allow for this type of experimentation. However, I cannot say if this 'failed fun' aspect was intentional from the designers' side, or if it was an aspect overlooked in the design process. In either case, some apps appear to promote more experimental interactions, hence allowing for a higher degree of appropriation (Dourish, 2006; McCarthy & Wright, 2004; Papert & Harel, 1991; Pink, Horst, et al., 2015) and agency than others. Pink et al. describe appropriation as 'the process by which people assign meaning to things, people, places and activities' (Pink, Horst, et al., 2015, p. 60). This appropriation aspect in the play category intersects with the appropriation aspect described in the design category and can be further illustrated through one more example, this time when children played with the Toca Tailor app. In this app, children can design and dress the character in different clothes. Lengths and widths can be changed in the designs with easy swipes along the edges of the clothes.

In one instance, a child, instead of focusing on dressing the character, focused instead on creating patterns through a combination of available suggested clothes details (see Figure 5.4). The child ignored the character's expressions, the indication of the season through the window (winter) or any other available interaction and focused on *digitally drawing* with the given patterns. While he played with it, I asked if he preferred to draw with a pencil or a finger, he replied that it did not matter, that they were the same. As Figure 5.4 shows, this child did not care about the positioning of the device. So even though the app had a vertical orientation, the child ignored that in favour of adopting his own approach. In this case, the child appropriated the game by focusing on drawing and creating patterns, overruling the core narrative and even ignoring the character. Whereas in the design category, children appropriate icons, either by entering the role-playing and identifying themselves with a character or by a sense of ownership when acknowledging that they know or have the app. In the play category, this appropriation is linked to overruling, creating or transforming a game narrative based on their play.

When asked what they liked about tablets, children from both Denmark and Japan repeated in their own languages the same short sentence, 'it is fun'. I did not engage them in further conversation to extract why they considered tablet playing as fun. Instead, I only coded it and incorporated it in the play category as one of its aspects. There can be several reasons why each child recognises this type of play as fun. However, in the context of this research, fun, as a common thread, links to motivation, wanting to use the device, and an expectation that using the tablet will be an enjoyable activity. I would not go as far as saying that these aspects related to fun necessarily cross all current activities involving tablet



Figure 5.4. Creating Patterns on a Piece of Clothing.

devices, as I can only make an assessment based on my one research set-up, which focused on play. However, regarding play, the fun aspect identified agrees with Sutton-Smith's acknowledgement that twentieth-century children identify play as pleasure, friends, voluntariness (Sutton-Smith, 2001). I complement that by saying that twentieth-first-century young children recognise tablet play in similar terms. However, I would not necessarily stretch this aspect to cover future uses of digital devices just yet. As children grow and devices become necessities with other types of functionalities, not all interactions might be considered fun. At the same time, these future interactions might be associated with playful memories of fun moments, leading back to early tablet experiences and nostalgia.

An outcome of this explorative mode of playing characterised by few expectations and problem-solving leads to yet another valuable characteristic of young children's digital play: engagement. By offering multiple contexts through several apps and stories, and having no fixed narrative, tablets allow for exploration in various modes and through fast alternations. Children enjoyed these characteristics during the observations, as they did not appear to get frustrated when the interaction did not succeed. For example, if icons failed to move, if controlling the icon was too difficult or it was not clear how to interact, etc. Instead, children either discontinued that activity to choose another app to play with or simply engaged in trying some more. When they quit the 'unsuccessful' app for another one, sometimes they would return to the 'unsuccessful' app to try it again. However, none of the observed children appeared to get frustrated with the device. With a tablet loaded with apps, it was the equivalent of children finding themselves in a room full of toys. You can become tired of one toy and

choose another one, but you will not necessarily leave the room; hence the engagement with the device.

Beyond the socio-cultural narratives permeating young children's perceptions of digital devices, children's experiences with tablets show that their play expectations go beyond some of the design characteristics currently found on apps. This expectation was visible when children tried interacting with non-interactive images or loading icons, creating their own play narrative by imposing their tastes and logic, and using the backward or forward arrows to continue playing. Through these play practices, where expectations lead to open experimentation such as trying to tap on any image available, browsing through the device, doodling by moving app icons around, 'taking him there', etc., children acquire perceptions of digital spaces. Notions of active and non-active areas and symbols, digital geographies emerging from content (as in the case of full areas inside apps), as well as content creating geographies (such as adding pages by dragging apps to this extra space beyond the screen) are negotiated and create a *thirdspace* (Gaines, 2006). The *narrativised semiotic system* (Marsh, 2014) is formed in this *thirdspace*, where children move through roles, rules and signs that are contextualised through their play (polysemous experiences, as described earlier in Chapter 3).

These polysemous experiences shaped by play practices also converge into one overarching perception of the tablet object as a toy. Tablets offer a wide range of play modes that match a wide range of interests, children can hear stories, take pictures, colour, draw, solve puzzles, move cars, trucks, boats and trains, each with its own types of rules and interaction. The tablet could be compared to a room full of toys spread around, and children seem to enjoy this multi-aspect. The variety of play options within one toy is also perceived as an advantage by some parents. For example, in an informal conversation with one child's parent, she mentioned that they (a couple) preferred tablet games, as space in city apartments can be an issue, and the tablet provided the 'same' experience of various toys without 'filling up' a room. It was also mentioned that 'old' apps could be deleted and new ones downloaded as kids grow with much less hassle and avoiding the time used in selecting which toys to give away.

App narratives differ in various ways, as some have rewards for an 'expected interaction', and no or little reward for any other unexpected interaction (LEGO, Gocco and Yogome apps); others have no clear path (Toca Boca apps). Based on the observations, young children who had not previously played with the apps available did not necessarily decode the designed narratives, rewards and what they were expected to do at first. Their play followed their interests and it did not focus on successful 'missions'. Instead, their play focused on having fun and entertaining interactions. They also creatively explored the possibilities in the apps and the devices (even minimal hacks, such as using the back button to re-play an interesting level instead of following the app's design flow). However, the children who appeared to have experience of playing on tablets were quick to identify basic narratives such as follow a path, get rewards, beat the 'bad guy', follow a mission, etc. As children played, they also decoded narratives, sometimes choosing to follow them, sometimes prioritising fun instead of the app's goal. The knowledge of these game narratives indicates a

degree of game literacy (Gee, 2003), as described in Chapter 3. The child was capable of decoding, interacting with the physical and digital interfaces and understanding the semiotic domain, its icons, narratives and modes. Beyond decoding and understanding, young children appeared to reflect and challenge when given designs while problem-solving the interaction by exploring and experimenting with the designed narratives, as in the case of the Chuggington app. When playing with this app, children who had chosen the app because they recognised the character (as said aloud) explored the map by dragging it around instead of following the mission requested. Even though arrows indicated directions on the tracks, children frequently ignored the designed suggestions and just played by dragging the map and/or the character around (Figure 5.5).

Another example illustrating game literacy occurred when children talked about what they had to do in a certain app, as described earlier in the LEGO apps. When saying they had to take ‘him there’, they had identified the goal of that mission, acknowledging who were the active actors: they, the children as the ones doing the action; the character, in this case the rescue boat, which is what can be moved; and ‘there’ representing the other character that needs to be rescued to complete the mission. In this example, children appear to have a clear map of the digital narrative together with their own role in it. This example also illustrates how tablets bridge realities through rich universes where children engage, explore, recognise and expand a wide range of symbols and narratives, agreeing with similar perceptions described by a number of scholars (Fleer, 2014; Marsh, 2010; Sicart, 2014). The *there* and the *here* co-exist and belong to the same playground, where digital and non-digital spaces compose multi-layered and multimodal experiences. All these experiences are culturally bound and shape tablets as an object to play with – a toy.

The play category covers interactions with tablets that fit and complement play-related theories. This category intersects with the other categories within the DPET taxonomy. As video games redefined play in the eighties, tablets are redefining play in the twenty-first century. Instead of cartridges, we have a digital library and stores or a console carrying an almost infinite amount of play choices. The tablet as a console affords play as play might have afforded the tablet console (Johnson, 2016)⁷.

⁷Following the thought that culture emerges from play (Huizinga, 1949), and as technological developments are contextually and culturally bound, we could infer that it was playing with possibilities and tech scenarios that led to our current technologies. This perception has been recently addressed by Johnson in his book *Wonderland* (2016). Still aligned with this thought, in 2005, together with Andreas Brøgger, I co-designed and co-taught a course entitled ‘the culture of play’ for Copenhagen University (KUA), where we presented and debated this idea of how play had been the key component in technology development and our current playful culture. I have further developed this course and taught it twice more since then, both at KUA and in Mexico.



Figure 5.5. (a) and (b) Playing with the Map (Not the Character) in an App.

5.2.4. *Interaction*

Interaction: refers to how physical interactions with tablets develop an embodied knowledge, which is performed through the hands. It takes into consideration some of the physical and digital affordances of current devices, while also acknowledging how digital and physical symbolisms, narratives and actions compose the tablet as a material.

Theoretical codes: hand knowledge, exploration, familiarity, privacy, fun, multimodality, literacies and engagement.

The interaction category is composed of seven codes. They all intersect in dealing with physical and tangible aspects of digital exploration. Using digital devices is the only way of learning the tangible and tactile interaction they afford – how much pressure, how much movement is needed to swipe, where and when to tap on icons, etc. If a child has never played with a touch-sensitive device, he/she will only learn it by playing on one. Tablet play could be compared to puzzle interaction – every first interaction with a device or an unknown app represents an imageless puzzle to solve. Furthermore, children between the ages of four to seven years old do not necessarily refrain from trying and experimenting, turning the *puzzles* into desirable obstacles. Therefore, this type of interaction pushes these children into an early trial and error scenario, leading to a steep learning curve with these devices. Regarding problem-solving, one could say that even deciding which app to play with is the first problem (of choice) to be solved.

Watching others is not sufficient to learn the actual tangible interactions. In spite of this, with some guidance, the tactile interactions are quickly learned. These aspects formed the hand knowledge and multimodality codes as hands play a major role when young children play with tablets. These codes also intertwine with familiarity, privacy, fun and literacies codes as the hand knowledge affects the sense of fun and the familiar, notions of ownership and ways of learning. For example, after children had chosen which device to use, their hands hesitated before swiping and they seemed unsure about their actions. Those devices were unfamiliar, not the ones they knew from previous tablet encounters, and children were aware that these devices were not their parents' or siblings' devices. So even though several children were acquainted with the technologies, the context and the experience were not 'familiar' and this aspect appeared to affect how they initially approached and interacted with the devices.

As described earlier, digital literacy scholars identify the role of the use in the processes related to acquiring and developing knowledge with digital technologies (Sefton-Green et al., 2016), therefore acknowledging the communication and relationship emerging from the interactions with digital technologies becomes a valuable aspect of defining digital literacy and related practices. Furthermore, the ways in which children communicate with digital devices also affects how they engage with and explore the possibilities within both online digital narratives and offline play. This exploratory aspect allows for discoveries and aligns with the narrativised semiotic *system*, where online and offline experiences mingle, composing young children's play experiences (Marsh, 2014). All these aspects, which shape the interaction category, are presented in more detail in the following paragraphs.

Throughout the observations, some actions became more constant than others, and during the transcription time, I developed a typology of these actions (presented earlier in Chapter 2). This process aided me in the transcriptions and

analysis as I could better define and transcribe the actions children executed while playing on the devices. This typology also aided me in defining some of the communication the hands executed while interacting with the devices.

One early aspect noted during the observations was that children learn their interactions while using the devices (Dewey, 1916; Schön, 1987). Some children were very skilled and used both hands in the interaction, while others who had little or no experience with similar devices mostly used only one hand. Despite the context of the observations and that the children had not tried those devices or some of the apps before, children's initial interactions adapted and frequently improved during the play. The digital language the device contains in its operating system dictates and shapes the physical interactions to be learned. Children were quick when trying and learning them. However, it was clear that children who had more practice with similar devices had a better 'feel' or better 'knowledge in the hands' (Merleau-Ponty, 2002). Some children struggled with basic swiping, others kept exchanging fingers when the initial tapping did not 'work', and they also struggled with tilting, convergent and divergent dragging. These basic movements, which tend to be overlooked and are popularly assumed to be intuitive (Clarke & Svanaes, 2014; Connell et al., 2015), were clearly not 'given', and instead children learned while they practised, sometimes also requesting help by asking how to do this or that action. Therefore, I encourage avoiding using terms such as intuitive when describing tablet digital interfaces. Children are masters of mimicking as part of their development. It is then not surprising that children also imitate the actions they see others doing when using touch-sensitive devices, such as smartphones and tablets. Therefore, when young children are presented with these devices, they are able to repeat some of these actions, although they have not necessarily acquired the subtleties required for successful interactions. Through trial and error, children develop this 'feel' and become more proficient users. This proficiency is achieved through the embodiment of the knowledge being acquired and developed by the interactions in themselves, or the *weaving* (Ingold, 1994, 2009, 2013). The *weaving*, as the phenomenon, represents the process of learning the material through working and experimenting with the material. This phenomenon occurs through the exchanges taking place between the child, the social and play narratives, and the physical device, which are the main actors in this specific interaction. The role of embodiment in the communication exchange between these actors is what shapes what I am proposing as digital penmanship.

Digital penmanship is the tactile skill and knowledge (acquired through the digits) that emerges and develops through the interactions with touch-sensitive digital devices.

This concept suggests the vital importance of the body in young children's communication with digital devices. Furthermore, digital penmanship adds a valuable aspect to digital literacy studies. This embodied knowledge is a communication not only between the child and device but also a type of *language* young children 'read' and recognise in each other while playing together or watching others play. These aspects became apparent when observing children playing in groups. Sometimes they would play together or interfere with the playing, during

or right before an action was about to take place. By recognising the other's intentions, some children would collaborate or disrupt the play orally or through an action, such as tapping on the device before the other child.

It is valuable to consider the role of the child, narrative and artefacts when talking about the embodiment of knowledge through playing with digital devices. In the event of tablet play, the child engages as a player, bringing his/her knowledge of play, characters and rules to the play experience. This background aids in making the child curious and motivated towards exploring a novel and pervasive object. The artefact is composed of the object itself, plus symbolisms, rules and narratives composing the digital as the material of the weaving (Ingold, 2009) or the crafting (Dourish, 2016; Pink et al., 2016). This crafting occurs in layers due to the affordances of the digital as material. Moreover, the modes of interaction allow for exploration of the device with both hands, without the child having to prioritise one hand as is the case with writing. As in typing or playing an instrument, tablets (and other touch-sensitive interfaces) afford ambidextrous interactions. These artefact affordances relate to narratives, modes of use (multimodality) and literacies described in the following.

The first digital tablet affordance deals with the device carrying a range of varied activities offering combined or distinct modes of interaction such as touch, voice and sounds in one portable device without necessarily requiring complimentary pieces. Some games offer physical counterparts that boost your performance when playing on a tablet, i.e., in the case of *Angry Birds* and *Fruit Ninja*, where you can buy a physical toy and put it on top of the tablet interface so it boosts the player's attacks, making them more powerful. It can be argued that multimodal platforms where one can play many games have existed in mobile and physical formats before, such as those where one can play chess, ludo, checkers, etc. However, they were not digital, and the actual board is dependent on other physical pieces in order to be used as a play platform.

A second digital tablet affordance regards multiple recognised icons and brands in one device compared with physical toys that carry a maximum of a couple of brands, such as LEGO, which associates its bricks with other famous franchises – *Ninjago*, *Harry Potter*, *Star Wars*, etc. Other portable digital toys and consoles present similar affordances such as Nintendo DS, although due to the app market comprising a wide range of apps at competitive prices, tablets have a clear advantage compared with other digital toys. These brands, many familiar from children's offline contexts, were quickly recognised and widely chosen by the children when glancing at the devices during the observations. Accordingly, I suggest that brand recognition in a digital environment transforms this environment into a familiar and fun space.

A third digital tablet affordance relates to physical characteristics. Tablets are portable devices that can be carried everywhere; they fit in small bags and backpacks and children carry them around on the go. When playing, they hold the device and it is often kept close to their body. The child sits 'still' while playing and this quiet behaviour can fit in various situations, from planes to cafés.

Therefore, whereas other play activities can be loud and erratic, digital play can be quieter and less chaotic than other types of play, but that very much depends on the activities being used on the device, as some apps can equally promote wandering and physical motion. In both cases, children are engaging in thinking, learning narratives, symbols, etc. and developing their digital penmanship.

A fourth digital tablet affordance relates to distinct semiotic notions of icons and signs having distinct symbolic attributes – for example digital spaces in the concept of adding extra ‘pages’ by dragging an icon to the side of the screen, creating locations for easy access to distinct types of games, videos, apps and content, or moving a device to move digital interfaces (although this aspect is not inherent of tablets, as they have existed for a long time in a variety of interfaces, from game consoles to a desktop mouse). Another example relates to iconography, the symbols gaining specific connotations and meanings, as in the case of faded icons or ‘locks’ to show they are not available. Tablets (together with smartphones) are popularising these features among young children.

A fifth digital tablet affordance can be divided into three aspects, all related to narratives. The first aspect deals with how the device offers a variety of game narratives related to the content option or the types and amount of apps available; the second aspect relates to the meta focus of the narratives while the child plays – dealing with the overarching play experience. The third aspect relates to the internal processes of the child making sense of his/her play through the device and app narratives with which he/she engages.

These affordances point towards how young children’s digital play practices are *heterogeneous engineering* (Law, 1992), where social, technology, conceptual and textual aspects shape the play (Law, 1992; Medina & Wohlwen, 2014; Sicart, 2014). Taking into consideration the development of digital penmanship, kinaesthetic components complement this heterogeneous engineering, such as the tactile embodied knowledge enacted by the hands. In sum, a large number of actors are combined into another product, in this case, the digital play experience.

The interaction category exposes how physical and digital aspects intertwine in the actions of young children playing with tablets. These actions are interdependent of current tablet affordances. The digital as a material allows for exploration and manipulation. In this category, I have highlighted how the hands learn how to interact by acting on the device. This interaction then shapes the ways the hands act. Through practice, the hands not only learn the feel of digital interaction, they also embody it and create a vocabulary of intentionality. *Other hands* share this vocabulary knowledge and they communicate the play to their peers while in a group, or even from a distance. In silence, the hands speak. Digital penmanship composes, together with other actions, the multimodal interactions occurring in children’s digital play. With use, this penmanship turns into a familiar performance with the artefact, shaping the physical and social interactions witnessed in tablet play practices.

5.2.5. Attachment

Attachment: refers to the relational aspects emerging and manifested through the play practices of young children. It also expands into how these physical interactions possibly overflow into personal narratives shaping one's history.

Theoretical codes: language, branding, identity/digital narratives, familiarity, ownership, agency and cultural aspects.

The last category in the taxonomy refers to attachment, or the relational aspects, which might influence the development of a range of emotions related to tablet devices. In its definition attachment implies relational behaviour between someone and something (or someone else) and little is attributed to the term beyond the relational behaviour. In the case of tablets, it can be argued that there may be an attachment being developed through a digital experience afforded by playing with the device, e.g., customisation of how things are displayed and assessed, which apps are installed as well as a sense of comfort related to a habit of using the device in specific environments or situations (trips, pastimes, holidays, etc.).

This category is composed of seven theoretical codes. These codes interconnect and blur into the play practices of young children, fostering emotional connections (Fleer, 2014; Roskos & Christie, 2011). When playing, young children engage with objects and stories composing personal narratives. The play experience shapes how these narratives unfold resonating with emotional values. Again, the concept of appropriation strikes a chord in this category, as it can be linked to the aspect of assigning a meaning to an activity or an object (Pink, Horst, et al., 2015). By playing with tablets, children link their experience to contexts, people and moments, assigning special memories and fostering attachments. So how play is described, how specific images and brands permeate the digital play experiences and how cultural aspects help towards framing this play congregate in the attachment category. Attachment is not necessarily directly visually informed as with other categories. Instead, attachment is an intangible concept and emerges from individual mental and physical processes. I suggest this category based on the analysis of the children's actions together with some of the words children uttered during the observations. I combine these empirical aspects with theories that help build the argument for the attachment term.

As described earlier, the experience of tablet play is heterogeneous, shaped by a number of actors composing it as a final product. This play experience then weaves itself into personal narratives, cultural perspectives and social history. The ways the apps are displayed and organised in each device also shape a type of narrative. By downloading and organising the apps' locations and creating distinct areas in each device, users dictate some of the interaction and most of that device geography. Each collection of apps creates a mosaic and a visual map (or in this case it could be called *m-app*) of the device with its distinct geographies. Customising touch-sensitive devices such as mobile phones and tablets has become common practice due to the manipulative characteristic they afford, where users can drag icons around and place them into chosen areas marking

the devices as 'their own'. Tablet play creates notions of digital space and environments defining emerging territories in children's playgrounds. These territories are marked by distinct aspects, which are common in digital landscapes, such as multimodal apps (Gillen et al., 2010; Liestøl, 2007; Weber & Dixon, 2010; Yamada-Rice, 2013) populating areas on the device, together with device affordances to change these landscapes by combining apps into groups or folders, or moving apps into other 'spaces' on the device.

Although spatial aspects might not gain much attention during everyday uses of digital devices, when researching young children's play with tablets, the semiotics of space (Gaines, 2006) became apparent. Children negotiated signs and contexts creating their own *thirdspace* (ibid.). Notions of digital play (Plowman & Stephen, 2014; Verenikina & Kervin, 2011), combined with apps and devices' ability to create 'areas' on demand, promote the development of a spatial semiotic knowledge. By customising a device, children engage in visual storytelling, where their preferences and imagery are depicted through the ways the apps might be organised. This visual story weaves itself in a child's own history. The tablet as a twenty-first-century toy becomes a reference to personal imaginaries (Fleer, 2014). Children, as they grow, carry with them these imaginaries and visual memories attached to the device. The familiarity code in this attachment category carries two (or more) connotations. The first relates to the familiar as an activity experienced with family members and relatives; the second relates to the object as known and recognised, carrying symbols that are also known and recognised, producing future nostalgia. These characteristics emerged through children's actions, e.g., looking for known apps or even choosing first the device they knew, and in their responses when asked when they played with similar devices. To this question, children replied by mentioning sometimes locations (at home, in the car) and sometimes contexts (while parents cook, on holidays).

The customisation also plays a role in the attachment. One invests time when customising a device by creating territories and recognised spaces. This investment is also observed in relationships with other toys or experiences, such as building an area for play and having that area dismantled. Another example would be failing to save a game after reaching some levels when playing a video-game. These cases do not necessarily lead to great frustration, however, momentarily, there is a sense of disappointment due to the individual investment. The tablet, emerging as a toy from the personal, social and contextual interrelations in children's lives (Bodrova & Leong, 2015; Sicart, 2014; Sutton-Smith, 1986) becomes more than a pastime. As a toy and through children's imaginaries while in play, tablets become a symbol in themselves, carrying a greater number of symbolisms through their interfaces with many games and playgrounds within a playground. When identifying oneself with a character ('it's me') or acknowledging one's role in the play ('I have to make ice cream for the people', 'I have to take him there'), children blend layers of reality and imagination, as in role-playing or performance. By physically acting in reality through their hands, children negotiate and blur real and abstract levels in their digital play (Fleer, 2014).

I would argue that the more one plays, the more symbolic value the object gains as more experiences and memories are created with and through it. Furthermore, I believe that by self-referencing, the child develops a sense of unity and involvement between him/her and the digital experience. All these aspects inform the identity, familiarity and ownership theoretical codes and are consequently linked to the attachment category. Besides, tablet symbols, brands and narratives extrapolate into other forms of play or in conversations that play a role in children's social exchanges with peers, siblings, etc. The social aspect is then noteworthy, considering tablets' pervasiveness in society and how apps' symbolisms and characters populate, besides conversations, other types of social exchanges by being present in clothing and other physical toys, as in the current cases of LEGO and *Minecraft*.

One other social aspect composing the attachment category refers to the concept of companionship. The idea of with whom (if anyone) children play is embedded in the agency theoretical code. Many of the children mentioned playing with the tablet on their own, while some mentioned sometimes playing with parents or siblings. When playing and engaging with characters, missions and a range of narratives, children role-play in the same way as when creating stories and scenarios for their teddy bears or other emotional rich objects. As pointed out by Fler (2014) when discussing Leontiev's work on play, while in play, objects are invested with a range of emotions and feelings, and I argue that the same is true for tablet play. As children play with tablets while alone, tablets, like other toys, can become a companion.

An additional aspect of the attachment category refers to a sense of ownership related to a physical characteristic when using tablets (and other types of touch-sensitive devices such as mobile phones). Due to the device's touch dependency, tablets are kept within reach. Children keep the devices close to their bodies, sometimes keeping them between both hands (even when the device is on a surface, as during the observations). This position allows for the use of both hands, but it also indicates a territorial marking as one's own, between one's arms. Children demarked their digital play by embracing the device when wanting to play alone, or opened their 'guard' by removing one hand or positioning the device between them and a peer when wanting to play together.

The combination of the characteristics presented here shape the attachment category in the taxonomy. Nevertheless, further research would be needed in order to inform the intensity of the attachment, or even if and how the attachment manifests itself in later life experiences.

I have proposed the Digital Play Experience taxonomy as a way to condense the final theoretical codes, and also to offer a structured angle when studying young children's play practices. In the process of interconnecting the theoretical codes, I repeatedly reviewed the findings and achieved clearer themes. The taxonomy synthesises while also expands the findings, trying to avoid disconnection from the empirical to the theoretical. In total, the taxonomy covers the key aspects encountered in my empirical data on young children's play practices: *vocabulary, design, play, interaction and attachment*. Each category can be used

alone, and as such can become a single focus of future studies. In the following, I summarise the taxonomy categories unfolded above and then propose how they could be further interlinked to advance my argument:

Vocabulary: refers to the verbal, physical and semiotic vocabulary being shaped and developed through tablet play.

Design: refers to interface aspects encountered in tablets that dictate or inform how to interact with the device. It also covers some of the current design limitations in existing platforms.

Play: refers to how tablets have entered and become a dynamic playground and how they evolve from device to toy, promoting playfulness and experimentation through children's play practices.

Interaction: refers to how physical interactions with tablets develop an embodied knowledge, which is performed through the hands. It takes into consideration some of the physical and digital affordances of current devices, while also acknowledging how digital and physical symbolisms, narratives and actions compose the tablet as a material.

Attachment: refers to the relational aspects emerging and manifested through the play practices of young children. It also expands into how these physical interactions possibly overflow into personal narratives shaping one's history.

5.3. Intertwining the Taxonomy Categories

It is noteworthy that one tablet event can intersect many of the taxonomy categories, but the categories offer distinct foci for the analysis. Firstly, a valuable aspect to consider during children's play with tablets refers to the lack of frustration due to little expectation regarding the interaction. This aspect intertwines the categories of attachment, design and play. As not necessarily seen in other activities, tablets tend to always respond in some way, you tap, an app opens, or you swipe, you change the icons, etc. The only moments when interactions are flawed happen during delays between an action and a reaction on the device or the loading screens, where often there is an icon, although it is not necessarily interactive. As one of the children mentioned that she did not like it when the device 'teased' her. Therefore, the low expectation regarding which types of responses there will be might offer a high threshold for frustration. Having this attribute combined with the amount and variety of activities available per device might offer a higher opportunity for longer engagement periods with a tablet device.

Secondly, another aspect observed that intertwines the play, design and interaction categories relates to how children played with digital tablets in various ways, e.g., by using some of the apps available as well as sometimes just moving apps around to re-organise the play space. This customisation of the space relates to other known play practices, for example, when playing with physical toys, children start by setting up the play, organising bricks before building something, as with LEGO bricks; building a 'house' before playing doll, marking the goal spaces for football, etc. Digital devices offer a similar capability,

although children might not initially set up this play space if they do not own a device, instead, a parent or older sibling might set up this space. Nevertheless, it is not uncommon to have ‘a child’s area’ on shared devices. In these ‘owned’ areas, children then have the agency to move around ‘their’ apps and create their digital playground, and this aspect was also coded as exploration and hand knowledge. The action of choosing or moving a certain toy/activity shows something about the children’s intentions and will, and it is part of the larger hand vocabulary. Even though I could not always hear the actual thinking behind the action (unless in situations where the child spoke aloud while interacting with the devices), I could code the actions as they were. Following a child’s gaze and hands over an interface with multiple choices guided me towards solving the hand communication puzzle and aided me towards seeing the thinking behind the action.

Thirdly, as apps populate digital spaces, children create spatial maps of them, learning their location and therefore become comfortable navigating this digital geography. This aspect intersects the vocabulary, design, play and attachment categories. Being able to own/create a space appeared to be a valued aspect when children used the devices. On the first interaction, they were ‘lost’ – not knowing what was available or where it was located. However, after encountering desirable apps – and children were excellent at identifying at first glance which apps were children’s apps – they learned their way and appeared to create a visual map of that device. With the map in place, the space for experimentation began, and children then took control of the device and played the role of ‘master’ by being able to ‘explore and customise’ their play spaces. This spatial recognition was observed as children both got in and out of apps (going back to a previous app and knowing where it was) whereas some children dragged apps icons around as if doodling with app icons, and when they navigated within apps’ own stories and activities.

5.4. Chapter Overview

This chapter has unfolded the taxonomy terms in order to further dissect the empirical data while also leveraging them. This chapter has presented my coding method by revealing the thinking behind my synthesising process. Through the analysis, I have discussed terms and categories aligning with aspects introduced in Chapter 3. I have also introduced and grounded the aspects supporting my theoretical contribution, which follows in the next chapter. Lastly, I have added to my discussion by providing some examples of how the taxonomy categories intertwine and provide further insights.