Play, Culture and Learning
Studies of Second-Language and Conceptual Development in Swedish Preschools
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Abstract
This thesis studies how second-language and conceptual development emerge through interactions in Swedish preschool environments. It studies how types of interaction, such as play, can scaffold children towards such developments.

The studies view interaction as multimodal and embodied and examine how children come to use and develop their second language or understanding of abstract concepts, through a range of communicative means other than language.

The data collection has been carried out in two separate periods. The first fieldwork followed two newcomer children learning a second language during their days at the preschool. The second fieldwork was conducted with a group of children during a science project about spinning.

The results concerning second-language development show how children can engage in play activity even before they share a common language, and that this can be afforded by the character of play activity based on rules and tacit understanding of relevant cultural patterns. Teachers also engage in play, so called guided play, which affords scaffolding for children. It is suggested that play activities in the preschool can function as an arena for children to interact, imitate the cultural rules and patterns around them and emerging use their second language. Moreover, the results show how the preschools are structured for children’s participation through their cultural patterns and imitable structures. As such, the preschool provides children with cultural affordances, and it is shown how these are also used by children in their play.

The results concerning conceptual development build on the notion that children develop in relation to cultural tools and artefacts, and that this is a highly perceptual and embodied process for the preschool child. It is exemplified how preschool’s provide environment and activities that can afford conceptual development, not least through use of digital tools, which also allows teachers to appropriate children’s play worlds to a pedagogical project. The teacher’s scaffolding interactions and use of the affordances of tools and the environment enable children to reason about the concepts in more conceptually conscious ways.

The conclusion of these results point out the importance of non-verbal resources for interaction that might lead to second-language and conceptual development. The thesis thus highlights how these are embodied processes for the developing child, which are notably integrated with social scaffolding and environmental affordances. On these grounds the thesis proposes an extended view of scaffolding that include the perceptual and affordances of the environment, a notion of possible concern for both researchers and practitioners.

Keywords: early childhood education, ECEC, preschool, play, affordances, embodiment, multimodal, interaction, second-language development, conceptual development, culture, cultural affordances, digital tools, artefacts, perception
For Hương and Juni, my family.
Tackord
(Acknowledgments)

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List of Papers

This thesis is based on the following papers, referred to in the text as Papers 1, 2, 3 and 4:


**Contributions of the author to the different manuscripts**

Paper 1: Data collection in 2013, before the Ph.D. dissertation. For the dissertation (in collaboration with Per Ledin) reinterpreted the data, co-wrote and prepared the paper.

Paper 2: Sole author.

Paper 3: Sole author.

Paper 4: Sole author.
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1. Introduction

This thesis studies how children’s participation in Swedish preschool environments can afford second-language and conceptual development. What is of foremost interest is how language and children’s other communicational means can be used and scaffolded in interactions between 3–5-year-old children and their teachers, and furthermore how the preschool environment can benefit the processes of second-language and conceptual development.

The preschool setting is particularly important as 94 per cent of 4–5-year-old children are enrolled in a preschool programme (Skolverket, 2017), making it the most common institutional setting for care, learning and development that children in Sweden encounter. Another point of interest is how this setting has changed in recent years. One change concerns how the preschool has become more linguistically diversified, as 24 per cent of children either are non-native Swedish or have both parents as non-natives (SCB, 2017). In 2017, nearly 5 per cent of the children in preschool were newly arrived in Sweden, (Skolverket, 2018a). Another change is at the curriculum level, where recent changes to curricula (Skolverket, 2011, 2018b), have downplayed the preschool’s traditional function as a setting for caretaking, and accentuated the preschool as an arena for learning and preparation for traditional school subjects.

This, in my view, makes the Swedish preschool an interesting area of enquiry, and what is of concern here is what happens in the actual pedagogically informed and didactically guided interactions between children and with their teachers. Since the Swedish preschool is founded on values of co-existence of play and learning, there is a need to understand how these work in the interactional encounters at the preschool. Pramling Samuelsson & Sheridan (2004:18) asks that research investigate how “an integration of play and learning [are] related to the objectives of children’s learning”, this thesis delves into how children start to use and develop their language within the playful interactions at preschools.

The thesis is a compilation consisting of four papers, this extended introduction and a summary. Papers 1 and 4 focus on how the preschool may afford second-language development and Papers 2 and 3 focus on conceptual development. The papers should be considered individual works that nonetheless rely on underlying assumptions of child development, language and communication and how they develop in early childhood. They rely on an understanding of child development as reinforced by interaction in culturally evolved environments, and that children meaningfully use non-verbal means of communication and their perception in those interactions. It will be argued how this way of embodied interaction within
the preschool setting of a physical environment consisting of tools, artefacts etc. provides scaffolding for second-language and conceptual development.

The papers will be referenced to as Paper 1–4 throughout the thesis and are therefore described in brief below.¹ It should be noted here, and expanded on in the theoretical chapter, how the thesis preferably uses development rather than learning or acquisition when referring to children’s language and communicational means. Along similar lines, Larsen-Freeman (2015) gives a list of reasons for the use of development instead of learning or acquisition of a second language. The most relevant of these reasons, pertaining to the purposes of this thesis, is that the studies do not focus on children learning or acquiring an end-state or specific form of language. Language in this sense, is not simply acquired, but what we will witness are some parts of children’s continual development in understanding the world around them. Moreover, as Larsen-Freeman (2015) points to, the use of language development hints that the use of language is as much about participation in a cultural and linguistic environment as it is a process of acquisition. This is inherently resonant with the thesis as it studies how the environments of the preschool, with aid from the scaffolding interactions among children and their teachers, possibly can afford development of a second language and concepts. This concerns also how children’s perception of activities, and use of gesture and other communicational means, are used in this process. As such, the metaphors of language being learnt, or acquired, risk missing how children’s second language and concepts develop in relation to these non-verbal means of understanding and communication.

It should also be explicitly noted, that these reservations concern children in early childhood, in the specific preschool environments. Indeed, adult learners of a second language, or children in late childhood, may require other conceptual and theoretical frameworks. In this thesis, the children assessed as having Swedish as a second language are simply cases of newly arrived children, or children who have otherwise not been exposed to Swedish. Thus, the theoretical frameworks are drawn from other areas of child development, as these children are developing based on the same principles, but not having been exposed to Swedish to the same extent as their peers.

Paper 1 studies how play at a preschool might provide opportunities for children with Swedish as a second language to use, and possibly develop it. In the paper, it is argued and exemplified how specific characteristics of play might allow children to be more prone to use their second language, and moreover fills a function of cultural learning, since the play activities are fundamentally based upon cultural rules and behaviours.

Paper 2 studies the development of concepts during a science project about spinning. The development of the concepts during the science project is shown to

¹ For a more thorough overview of the papers, the reader is referred to the complete individual works in Chapter 10 or to the longer summaries in Chapter 5 in this work.
be markedly influenced based on children’s interests and use of a spinning artefact, the spinning top. As children play with spinning artefacts or construct them themselves, the conceptual understanding emerging is seen to be based in children’s perception and embodied ways of understanding. Through interaction with peers, and importantly, in scaffolding interactions with teachers, a more verbal descriptive language of spinning and related concepts emerged during the science project.

Paper 3 returns to the data from the science project about spinning, but examines how digital tools and artefacts are used to scaffold children’s understanding of the concepts. The digital tool of a computer and projector is aptly used by the teacher to draw from children’s popular culture and make use of them in scaffolding interactions. Here, notions of how attention ought to be guided to aim children towards educational goals become a concern and the analytical examples make evident how this pushes the limits of guided playful learning into areas of instruction.

Paper 4 merges the sets of data and looks more broadly at what the preschools, their routines and environments might afford in terms of second-language development. It is argued, that the routine structure, typical for preschools with daily circle times, mealtimes etc. provides cultural structures that the children participate in with their second language. Moreover, these structures provide rules and other behavioural patterns that the children use in their play. Thus, it points to some possibly symbiotic features of the conjoining of play and learning, typical for the Swedish preschool model.

### 1.1. Aim

This thesis will study how second-language and conceptual development emerge through interactions in Swedish preschool environments. The focus will be on the ways that specific types of interactions scaffold such development. It is important that the children studied are beginners in what they are learning, be it a second language or a new understanding of an abstract concept. This means that they communicate both verbally and non-verbally and that means of communication, other than language, play a significant role in the multimodal interactions.

This is set within the specific conditions that are afforded by the two Swedish preschools where the studies have been conducted. A typical condition of Swedish preschools is that play, and learning are fundamentally interconnected, and therefore a short background about these conditions is in place, before returning to the research questions.

### 1.2. The Swedish Preschool

The preschool plays an important role in the Swedish society. Sweden has a long tradition of public investment in the early childhood sector, it is one of the countries
with the highest quality of early childhood education and care (ECEC) according to OECD (2001) comparative measures.

Swedish society has long-standing publicly funded childcare. This has in part been important for the women’s movement in Sweden, allowing mothers to enter the workforce (Hammarström-Lewenhagen, 2013). At present, employment rates are high, with an employment rate among women of 79.8%, the highest in the European Union (Eurostat, 2018). This combined with few multigenerational households (Eurostat, 2011), creates an imminent need for childcare during work days.

The Swedish preschool is more than a place for childcare. At least since the 1970s, the preschool has in some sense been an institution for the preparation of children for school (Hammarström-Lewenhagen, 2013). This was, however, stated most explicitly in 1998, when the preschool’s national curriculum was established. This was an official push to further establish the preschool as an official arena that prepares children in areas of literacy, numeracy, science etc. (Pramling Samuelsson & Sheridan, 2010). One reason for Swedish preschools’ continuous high scores in the international comparisons, is pointed out by Sheridan et al. (2009), to be the comparatively high adult–child ratio that allows for more frequent communicative interactions between teachers and children.

The National Agency for Education (Skolverket) states the importance of communication, language and learning as it permeates the curricula, as they are said to be “inseparably linked together” (Skolverket, 2011:6). Language, in the curriculum, is not isolated to the Swedish language. It also endorses multilingual development for children with different linguistic backgrounds and asserts that “different forms of language and knowledge, as well as different ways of learning, are brought into balance and together form a whole” (Skolverket, 2011:6).

The Swedish preschool’s dual focus on both care and learning is evident here and present in the studies. This model has sometimes been termed educare, as in the conjoining of education and learning in “a balanced mix” (Jönsson, Sandell & Tallberg-Broman, 2012). While hailed as a mostly successful enterprise (e.g. OECD, 2001), issues have been raised about the tensions between care and learning that may arise (Sundberg et al., 2016). This is not least relevant for children with multilingual background. Björk-Willén, Gruber and Puskás (2013) points out that there are few studies of how preschools deal with linguistic diversity in the preschool practice. They furthermore want to direct research attention to how children play, learn and communicate in the preschool, especially in situations where participants do not share a common language.

Such communicative interactions are central to this thesis and are also attuned to the preschool curriculum that states how a teacher should strive so that the children “develop their use of spoken language, vocabulary and concepts, as well as the ability to play with words, relate something, express their thoughts, ask questions, and put forward their arguments and communicate with others” (Skolverket, 2011). Even though such goals for learning are clear in the curriculum, it should be stated,
that preschools in Sweden do not have the character of direct-instructional activities. The centrality of playful forms of learning and avoidance of school-like instruction is summarized by what are referred to as developmentally appropriate programs (Bjorklund & Causey, 2018), i.e. preschools that prioritise children’s free play and other forms of playful learning activities.

The Swedish preschool might be untypical in some other regards, for example, the preschools studied in this thesis have weekly visits to parks, playgrounds and woods, and others may even be based on so-called outdoor pedagogy. The central point is that the preschools arrange activities for children to playfully explore and interact with the world around them where natural environments can be found. This type of playful interaction underpins some of the key analytical examples of the thesis, and sometimes falls into the borderlands between informal interaction and instruction. Often, teachers are on the periphery of the children’s play activities, or even joining them. Thus, it might be more just to frame many of the interactions studied in the thesis like Hirsh-Pasek et al. (2009), as guided play, a middle ground of play and instruction.

This thesis concerns how forms of play, and guided play, are used in preschool practices and functions in interaction, and how play can be used specifically with children developing their second language and concepts. This subject is of specific relevance as it resonates with the principles on which the Swedish preschool is founded but is also an important matter on an international scale. As Miller & Almon (2009) notes, time for children’s play is declining to make way for instructional activities in preschools. Research into guided play instead highlights the role of playful learning, which can lead to academic outcomes. This thesis contains examples of how this is coordinated and executed in the preschool environments, its limits and when it becomes a case of instructional activity.

The dual focus on play and learning are not haphazardly chosen, rather as Pramling Samuelsson & Sheridan (2010) points out – the Swedish preschool, and its curriculum is indeed founded on a sociocultural perspective where play and learning are intertwined. It is not surprising, therefore, that these themes are salient within the papers of the thesis. The sociocultural approach is also an approach endorsed, even if somewhat modified in the thesis, as it naturally binds social and cultural learning to how children experience their world in playful activity.

1.3. Empirical and Theoretical Research Questions

The research questions of the thesis have been divided by their empirical or theoretical character. Each of the questions will be returned to and answered in the concluding discussion in Chapter 6, sections 6.1 and 6.2. This has been done to allow readability and clarity to what the collected contributions of the thesis studies are. To further direct the questions towards areas of inquiry, they have been sorted into sets – three sets of empirical and three sets of theoretical research questions.
The first set of empirical research questions concern play and its possibilities for enabling second-language and conceptual development. The second set of questions are directed towards the specifics of the preschool environment and the values of the Swedish preschool. The third set of questions addresses conceptual development specifically, in relation to preschool environments and activities.

The thesis’ empirical research questions are:

- What possibilities or limits for second-language use and development arise in play activities in the preschool environments? What are the functions of different types of play? How can interaction with teachers contribute to children’s development of second language and concepts through play? (Papers 1, 2, 3 & 4).
- What affordances for second-language development do the preschool’s routine activities and environments provide? How is second-language development integrated into the Swedish preschool days of play and learning? (Papers 1 & 4)
- How are activities set up in the preschool environment for children to explore concepts? What are the contributions of non-verbal experiences and other communicative means to the developing conceptual language in these activities? How do tools and artefacts contribute to these processes? (Papers 2 & 3)

The thesis explores the process of language and conceptual development as being continual, involving children’s perceptions and tactile ways of knowing and communicating about the world. Thus, the thesis favours approaches where language and other non-verbal means of communication are symbiotic parts (e.g. McNeill, 2012; Goldin-Meadow, 2015), or, in short, views of communication as being embodied. This presupposes that humans can fundamentally understand each other, even before sharing a common language, and this presupposition will be returned to throughout the thesis, as both a theoretical and an empirical notion.

The thesis aims and research questions are studied through observations of children’s behaviour set within the preschool environments. Observation is a suitable method to the study of children at this age, as Pellegrini, Symons & Hoch (2012) notes, as it allows children to act in the playful ways that might be afforded by this taking place in the actual preschool setting. Moreover, as Cole (1996) points out, research with children in natural settings allow them to perform better and make utterances that they would not in a more artificial environment. Moreover, this might add to our understanding as to what occurs between children and teachers during their interaction in the preschool environment, and how these interactions help in the work towards meeting the goals in the curriculum for language and conceptual development. The aims are not mere empirical descrip-
tions of these situations and processes, but are also engages some theoretical ques-
tions of interest in the thesis.

The first set of theoretical questions concerns second-language development, how it is set within a specific, and possibly imitable, environment. The second set of questions aims to relate how non-verbal means of perceiving and communicating are related to the processes of second-language and conceptual development. The third asks about how the special character of play can be understood as parts of second-language and conceptual development.

The theoretical research questions are:

- How does children’s participation within social and cultural environments aid second-language development? How does imitation play a role in this process?
- How are perception and non-verbal means of communication related to second-language and conceptual development? What are the roles of external tools and affordances of the environment in this process?
- What are the influences of play on the processes of second-language and conceptual development?

These sets of questions are to be answered in Chapter 6. To give a richer back-
ground to the thesis, and its empirical and theoretical inquires, the next section pro-
vides an overview of some relevant previous research.
2. Research about Preschools for Play, Language and Conceptual Development

This section contains an overview of research relevant to the thesis in some research areas. One area concerns the preschool as a setting for second-language development, and specifically research on environments somewhat compatible with the context of the Swedish preschool. One area of research concerns how conceptual development might be fostered in the preschool environments through pedagogical activities and what the tools and artefacts at the preschool might afford.

The research provided will to a large extent appear in the individual papers. For each paper, searches mostly (but not exclusively) have been conducted in the databases DiVA (Digital Archive Online), Web of Science, ERIC, Scopus and Google Scholar. From the literature, a range of papers broadly relevant to the field of inquiry can be gathered. During the process of research and of writing, relevant papers are honed with a sharpening focus as the paper is concluded. This part presents a background though an overview of research relevant to key topics in the papers.

There is a large cross-cultural diversity to how programmes in early childhood are set up. Where some prioritise so-called school-readiness from an early age, such as in some U.S. settings, aiming preschool’s towards preparation for later high-stakes testing (c.f. Miller & Almond, 2009), while others, such as the Swedish system focuses on playful learning activities and give children substantial time for free-play activities every day. This cannot however describe all the early childhood settings of a country but might be hint at key trends or some fundamental values.

Different preschool systems in the U.S. were categorized by Fuligni et al. (2012) based on quantity of free-choice or structured instructional activities. In the study, they found a type categorised as “balanced–structured”, this early childhood setting was reminiscent of a Swedish way of structuring children’s days, meaning that some of the day contains routines or more instructionally-oriented activities (e.g. circle time, subject-related activities etc.) and a substantial part was allotted to children’s free-choice activities, such as “free play”. Moreover, when comparing measures from this type of programme with other more instructionally based and more loosely structured early childhood settings, Fuligni et al. (2012) finds the most positive outcomes for these balanced early childhood settings, as children in the balanced programmes scored higher on vocabulary scores than children in high free-choice settings.

The Swedish preschool, at a general level can be described as a form of balanced setting, with its integrated values of learning, play and care. This thesis concerns what happens in preschool interaction in environments that provide a balance
between education and care, between planned instructional activities, routines and children’s play. And thus, also concerns what affordances for second-language and conceptual development the participation in Swedish preschool settings might provide.

2.1. Language Development in Preschool

For convenience, the research divided into two parts concerning second-language development during preschool. The first part concerns how the common preschool routine activities of circle time and mealtimes might provide opportunities for the child learning a second language. The second part concerns research on how play functions for the children developing a second language.

2.1.1. Second-language development in preschool routines

Days in the Swedish preschool are usually structured around routines, blending caretaking and learning. A typical day at a preschool may consist of a schedule consisting of, for example, mealtimes, naps, circle time, outdoor play, excursions and free play (e.g. Pramling Samuelsson & Sheridan, 2010). This gives an overall emphasis on play and playful learning activities, whilst the opportunities for instructed learning, which might occur in some form during circle time, is limited.

The importance of the frequency and repetition of such routine events should not be understated. Routines might provide education opportunities if conducted in a goal-oriented way (Bustamante et al., 2018). Nelson (2007) concludes from studies of young children that they can acquire understanding of concepts and language associated with them by attending simple everyday events.

Moreover, in the context of preschools, Siraj-Blatchford (2010) points out, that the skills of the preschool teacher and other pedagogical staff are to a large extent used to engage children in daily activities by sharing attention, communicating with children and directing attention in everyday activities. These interactions are not trivial for learning purposes, and the skilled teacher might guide these towards possible learning objectives. Concerning how the routines of the Swedish preschool and second-language learning children, Williams (2001) suggests that common routines, such as mealtimes and circle time can encompass important learning opportunities. Williams (2001) found that children can observe and imitate each other, and as such the children act as role models for each other’s learning. This contains more possibilities for teacher scaffolding, where Kultti (2013) observes how teacher’s interactions during mealtimes provided opportunities for second-language learning. The mealtimes in the preschool provided an informal arena for learning, where teachers may speak to children about the common objects, and occasionally branching out to other topics.

To participate in the routines at preschool can be compared to Barbara Rogoff’s research on development through becoming a member of a community. Rogoff
(2003) highlights the notion of “chiming in” to the local speech community as an important concept. By participating in community activities, children can gradually enter the language, tasks and routines of the group. Here it is evident how language learning and the socializing functions of learning in a specific culture fit together. To this point, preschool environments in Sweden are commonly described as “child-friendly”, fundamentally allowing child participation and gradual involvement. This can be exemplified by Cekaite (2007) and the study of the interactional development of a girl in an immersion classroom. During the year of study, the girl began with simple greetings and successively progressed into being an accepted member of the community through using both verbal and gestural means for communicating with her peers.

Moreover, some of the preschool routines are more academically oriented. The most common of such routines in the Swedish preschool is circle time. Circle time is according to Bustamante et al. (2018) a “near universal” in preschool settings. And while circle time activities might provide opportunities for participation and learning, Bustamante et al. (2018) critically concludes that, in many preschools, circle time is not linguistically challenging enough to provide a foundation for the development of children’s language. At the same time, circle time is seen to foster the type of interactional routines that is still common in many school settings, with hand-raising and turn-taking structures resembling the initiative-response-evaluation (IRE) pattern (Mehan, 1979), and might thus considered a type of socialization for future schooling.

Here it is important to point to preschool programmes that are called developmentally appropriate (Bjorklund & Causey, 2018), i.e. programmes that prioritize playful learning and a positive social climate rather than time for direct instruction. These programmes outperform instructionally-based preschool programmes in several studies, in their long-term effects on later schooling (Stipek et al., 1995; Marcon, 1999), and some studies even find negative effects of some instructional preschool programmes deemphasizing social skills (Stipek et al., 1998).

A nuanced finding in this area of research is Bonawitz et al. (2011:322), in the comparison of instructional and play-based programmes, it was found that the instructional programmes were superior when teaching specific skills or presenting information, but at the same time limited children’s exploration of new phenomena and artefacts of interest, what they call “the double-edged sword of pedagogy”. These findings provide a segue to research on play and the special forms of guided play that blends play with adult scaffolding. As we will encounter in the studies, this is a continuous balancing act between children’s free-play or explorative activities, and the times when teachers choose to guide or instruct children.

2.1.2 Learning and second-language development through play
Kathy Hirsh-Pasek and Roberta Golinkoff amongst others (see Singer, Golinkoff, and Hirsh-Pasek, 2006; Hirsh-Pasek, Golinkoff, Berk & Singer, 2009) has in a long range
of publications on their experimental studies and reviews of literature raised the importance of play for children’s overall development and well-being, where language development is one of several factors. Furthermore, Weisberg, Hirsh-Pasek & Golinkoff (2013) promotes a distinction between children’s free-play activities and what is in the literature referred to as guided play, a term for the middle-ground between instruction and free play that somehow involves adults, such as preschool teachers. This might be in the form of teachers who deliberately scaffold children in child- and/or teacher-initiated play, or more subtly organise environments so that they are directed towards learning goals. Moreover, Weisberg, Hirsh-Pasek & Golinkoff (2013:104) concludes from an overview of research on guided play that, “The evidence suggests that such approaches often outperform direct-instruction approaches in encouraging a variety of positive academic outcomes”, this is also including different measures of language development. It should also be noted how different forms of play might affect children learning a language. In their intervention study on low-SES children, Toub et al. (2018) noticed significant advantages for children in groups focusing on guided or “directed play” as compared to children in free play groups. These findings are of key interest, as the studies in this thesis will further examine what type of affordances different forms of play might bring to the child developing second language and conceptual understanding.

For our purposes, how play might function to support children developing a new language is of interest. Many of the children under study are multilingual subjects, and it will be discussed further in the methods chapter where it is decided that children be described as second-language learners rather than as simply multilingual children, to avoid diffusing these concepts. For the time being, the interest lies with those situations pinpointed by Björk-Willén, Gruber & Puskás (2013), where children of different linguistic proficiency act together in the preschool practices. And specifically, what type of affordances for second-language interaction in the preschool might provide.

What might the play-based learning programmes provide for children, if we probe into evidence from the practices? Susan Ervin-Tripp (1986, 1991) research into second-language learning children at preschool suggested that second language at preschool age develops in ways that are similar or identical to how children acquire their first language. Ervin-Tripp (1991) suggests that the formulaic structure of language use in preschool can aid children’s second language development, in similar ways that any child would imitate language in their surroundings. However, Ervin-Tripp (1991) also observes the potential of scaffolding from peers and teachers that have the majority language as their native first language. Of most relevance for this thesis, Ervin-Tripp (1986) bears witness to how the structures of everyday routines, in and out of preschool, provide examples, or rather schemas, the children would later play with, as children would play shop, or “being on the phone” etc.
These types of imitational routines by children reoccurs in the Björk-Willén (2008) study of bilingual children’s interaction, where imitation of both language and gestures was observed to such degree they were termed “shadowing”. Papers 1 & 4 in this thesis are concerned greatly with how children imitate others in their second language, and in accordance with studies such as Piker (2013) show the ways that children’s play supports second language development through children’s engagement with others, and importantly offers communicational bridges with children and adults that are native speakers. Contrary to the overwhelmingly positive outcomes of play, however, Logan (1991) observes how second-language learning children, who had a first language in common, formed subgroups that impeded contact with the majority language speaking children. That might be a possible problem, especially in preschools that are more balanced towards children’s free play. In this thesis’ studies however, none of the children learning Swedish as a second language share the same first language as their peers, or teachers, in the respective preschool department. Therefore, this thesis is not able to make any contribution to such a hypothesis. It might also provide an explanation as to why code-switching is not a well-used resource by the children of study, as it is shown to be in studies such as the Cromdal (2001) study of bilingual children in play.

The uses of imitation in play take many forms, Björk-Willén & Cromdal (2009) notes how children formed a circle time within their “free play” practice. Moreover, Cekaite & Aronsson (2004, 2005) identify the playful language use of children. The second-language learning children used repetition reminiscent of circle time as a form of “joke” that also requires some form of metalinguistic understanding of language. These types of findings attest to Ratner & Bruner’s (1977) earlier findings on how simple play routines, for example, peek-a-boo, provide a predictable structure, and that this predictability might function as a scaffold for understanding some basics of a language.

2.2. Science Learning and Conceptual Development in the Preschool

Science learning in preschool or more precisely, for our purposes here, how children develop conceptual understanding, is an area of much debate. Vosniadou (2007:55) reviews cognitive and social-constructivist approaches to understanding how children develop concepts and concludes that it can develop through “a constructive interaction with the world through a variety of mediated symbolic structures, some internal and some external, in rich sociocultural settings”. Might the preschool be a place where such settings can be provided? Papers 2 & 3 in this thesis hint that Swedish preschools may deliver such settings, in ways that push the boundaries of what preschool education might look like.

While the theoretical disputes on the nature of science learning and how children develop an understanding of concepts are vigorously debated (see Schoultz,
Säljö & Wyndhamn, 2001; Vosniadou, 2007 for different takes on this), practice-oriented researchers try to understand children’s learning where it takes place. In this mode of research Thulin & Pramling (2009: 139) notes how “empirical research on science learning in preschool settings is rare”. Papers 2 & 3 in this thesis follow up on this need, and add both empirical ways that science learning in preschool can be conducted, but also ways to a theoretical understanding that might be compatible with how the Swedish preschool is outlined.

The science learning taking place in Swedish preschools can be described as what Siraj-Blatchford, 2001) terms emergent science. This type of science learning is not founded on direct instruction, rather, it is discovery-based, rooted in play, and built on children’s own interest in nature and how it functions. What has traditionally been instructed in the school-age, is built up through children’s interactions and dialogues with peers and teachers in natural or arranged activities that might foster children’s interest in nature and the world around them.

How children are in the emergent science-type of project is in alignment with how Lemke (1990) observes how children enter into the language of science. Lemke (1990) sees in his important contribution to the study of science in school – that learning the language of science in school is built on a wide range of resources, in addition to language, for meaning-making around scientific topics. When applying this line of thinking to their ethnographical studies of preschool science projects, Siry, Ziegler & Max (2012) notes that children at this age are essentially doing science, by experiencing, talking, playing, and trying their thoughts out etc. This way of doing science, is reminiscent of the Pramling & Pramling Samuelsson (2001) study of a child’s exploration of water. The child tries out different artefacts in water, as a form of experiential hypothesis testing, simply reiterating the child’s hypothesis. An example of dialogue between a child (C) and a teacher (T) (from Pramling & Pramling Samuelsson, 2001:142):

* C: It floats!
* T: Why does it float then?
* C: Because, because it has holes.

The dialogue subsequently leads the teacher to encourage the child to try out the hypothesis of holes with another object (Pramling & Pramling Samuelsson, 2001). This type of interaction is typical for the science project under study in Papers 2 & 3.

There is more interest in interactions like this, going beyond the mere spoken dialogue of child and teacher. This type of learning is hands-on and has been reported in studies of Swedish preschools such as the Klaar & Öhman (2014) study of outdoor activity. They noticed that children seemed to gain an understanding of natural phenomena through their outdoor play, and teachers could encourage children in their bodily explorations of such phenomena. While bodily experience is one step in learning, one might also draw on notions made by Goodwin (1995) who
points out that bodily means, environments and perceptual understanding of relevant artefacts are an important part of the work of practicing natural scientists. To this point, Danielsson (2016) found how teachers use a combination of modes when describing physical concepts during science learning in school. Danielsson (2016) calls the instances where teachers draw upon a combination of representational modes (such as speech and gestures) “multimodal ensembles”, which occur with differing sets of affordances for explaining concepts. Likewise, Roth & Lawless (2002) notes in the study of a science project in school that deictic and iconic gesturing early in the project developed into more descriptive language in the end. Hence, Roth & Lawless (2002:380) concludes that “hands-on learning affords new forms of observational and theoretical talk”.

The role of artefacts for science learning is central for this thesis and is also in line with sociocultural approaches to learning endorsed here (e.g. Säljö, 2005). In Paper 2, the role of a spinning artefact, the commercialised spinning top called Beyblade, plays a significant role. Schoultz, Säljö & Wyndhamn (2001) points to how children’s science reasoning is fundamentally transformed when supplementary means are used. This approach is sympathetic to this thesis’ studies. Paper 2, for example, shows how tools are not only used to mediate as teachers scaffold children’s reasoning about concepts, but also in free play, as teachers transform the environment, by changing or adding artefacts. This gives the children the opportunity, for example, to make new constructions of spinning tops, thus developing on their interests. A theme much reminiscent of what Sundberg et al. (2016) observes at another preschool with a science project about spinning, where artefacts such as beads, balls, tyres and cylinders etc. were used by the children to explore the concept.

A specific type of artefacts relevant to the thesis are digital artefacts and tools, and how they are used in learning processes. In Paper 3, how such artefacts are used by the preschool during the science project, intersecting the worlds of children’s play and learning, is explored in more detail. Säljö (2010:62) notes “that the developments that follow in the wake of digital technology are exerting a pressure on education and the particular metaphors of learning on which instruction has been based”. To this point, the learning situations explored in Paper 3 are afforded by streaming sites that previously might not have been used for learning. The digital tools, therefore, change the pedagogical practices. Roth & Lawless (2002) noted during the science project in physics, how the digital models offered new ways for them to conceptualize the phenomena of motion, through gesturing, as well as verbally. As Edwards et al. (2017) alludes to, there is today a rich plethora in the ecology of possible tools and artefacts that might be brought into a learning situation. The thesis’ studies, then, also present examples of some possible affordances for learning that these might provide.

The uses of artefacts in the preschool science project point to ways that this might be a supportive style of learning in the preschool age. There is additional support for this way of learning conceptual language, as Conezio & French (2002;
French, 2004) shows in their studies of science learning in preschool. They suggest, that science learning activities provide a supportive setting for language learning, since the language used in science activities often is contextualized for the children and the clear use of artefacts provides learning opportunities. They observed a more frequent use of abstract vocabulary, as children progressed through a science project based on discovery along with teachers scaffolding interactions.

While these studies promote some form of experientially-based science learning through natural objects or other artefacts, one also must consider studies that are more cautionary to such conclusions. For example, Larsson (2013) sees learning potentials in children’s play with artefacts, but often observed how the teacher missed the potential opportunities for learning with children, around those critical moments when children question how the artefacts work in nature. For example, a child struggling with a sledge on a snowy hill, provides an opportunity to discover friction. To this point, Sundberg et al. (2016) conducted a battery of studies on the science projects at several Swedish preschools and found a wide range of activities (physical, sensory, creative/aesthetic, imaginative, play and storytelling). They conclude that different types of activities can be effectively employed at different stages of a science project, to create potentially rich learning opportunities. Sundberg et al. (2016), however, observed significant differences in how science learning was applied at the preschools, where some provided elaborate programmes and projects for the children while other preschools did not include any instruction or scaffolding activities at all, and children were left to explore on their own. Sundberg et al. (2016) provides a possible explanation in that the model of education and care (educare), and its inexperience with explicit teaching of concepts, creates an uncertainty among preschools in how to approach science learning.

It might be, as Siry & Kremer (2011) concludes in the study of preschool science, that the learning opportunities arise when children’s interests and curiosity are aligned with the preschool’s science activities. This can successfully be combined with what Fleer, Gomes & March (2014:46) see as a “sciencing attitude” among the preschool teachers that in the study explained their science practices. These teachers saw learning opportunities for children in the environments and artefacts around them and could potentially create learning situations in them.
3. Theoretical Framework

This chapter is a broader theoretical framework that provides underpinnings for all the thesis’ theoretical assumptions. First is a section establishing some metatheoretical assumptions of how the thesis rests on theories where relations and interactions between people and their cultural environments are paramount in their development. After this, there are sections regarding different aspects of child language and communicative development. These sections establish how children’s language develops together with other communicational means and are interconnected with learning as part of the sociocultural environment. Lastly, there is a section on play where several of these theoretical components are brought together.

3.1. Theories of Development and Learning in Interaction

This thesis and its compiled papers take a view of development and learning that rests on the understanding that child (and human) development must be understood as more than a biological, or social, or cultural phenomena. It is an interaction, or relation amongst these levels.

Willis Overton (2013, 2015) outlines different positions in developmental science and their underlying, or metatheoretical assumptions, and terms one of such positions as “relational developmental system” theories, or RDS. These types of theories presume that individuals are active agents that develop over time and in relation to their sociocultural environments.

The thesis’ theoretical interest lies within the scope of these types of theories, as children’s interaction with the world and the other cultural agents in it are seen as essential influences on development. This assumption favours explanations of children’s development that include relations of children and their sociocultural milieu (e.g. Vygotsky, 1978; Tomasello, 2019), and their potential for action within those environments (e.g. Gibson, 1979; Reed, 1991; Sanders, 1997), rather than explanations of a more determined nature (e.g. behavioural genetics). Applied to the fields of language development, the theoretical frames used tend towards those theories that see it as both reliant on individual factors and the language as used within the social environments (e.g. Nelson, 1996; Tomasello, 2003).

Relational-developmental theories thus take the bi-directional influence of personal and contextual factors of development as co-constitutional (Overton 2013, 2015). By this standard, it is not a question of whether development occurs as biological growth or social learning, but rather, how individual children develop in certain environments. Today it is more commonly understood that our sociocultural
environments affect us in ways that range from the biological level of genes up to levels of behaviour (e.g. Jablonka & Lamb 2005; Moore 2017). Lerner & Overton (2017) argues that it is time to let go of theories that reduce development to either/or influences of biology or social constructs, as they are interrelated.

A reoccurring theme and pillar of the thesis are forms of interaction, i.e. ways for children to relate with others and their world through interaction and how we humans can connect with each other and develop an ever-increasing sense and knowledge of our environment. From early on, there seems to be a need to understand others and humans seem to have predisposed ways of understanding and “reading” others (Hrdy, 2009), ways to find patterns in our surrounding environments (Tomasello, 1999) and to create meaningful understanding of our world through language and communication (Hurford, 2007). Several points that will be made throughout the thesis will rely on these assumptions that they govern our ability to share intersubjective understandings among us, and that this is to a large extent accomplished through our means of communication. To understand others, their intentions, and the intersubjectively shared meanings, is also shorthand for understanding people as actors in cultural worlds.

This gives some theoretical background and underpinning to this thesis that encompass all the theoretical perspectives of Papers 1–4. More specifically, it underpins a theoretical perspective that will reoccur throughout the thesis and its papers that rests on the assumption that the learning and development of individuals is wholly influenced and conflated with culture. This is at heart a Vygotskyan (1978) perspective on child development, which draws upon insights from cultural psychology (e.g. Cole 1996; Nelson, 2007; Tomasello, 1999), and insights of how a child’s first and second-language development are interrelated with cultural learning (cf. Säljö, 2000; Tomasello, 2003; Lantolf & Thorne, 2006).

To more thoroughly understand this, we next look at culture and its interrelation with human development.

### 3.1.1. Culture in learning and development

Human culture has in important ways been shaped by its character of being cumulative, namely successions of previous generations can be built upon, refuted or thought anew. As Tennie, Call & Tomasello (2009) describes, culture has a “ratcheting” character trait, where achievements and insights of a culture can be kept and be traded across generations. In this way, culture is one part of what Richerson & Boyd (2005) calls the “dual-inheritance model”, wherein humans have two basic sources of inheritance: biological and cultural. Human culture, compared to other primates, is not only transmitted but accumulated, and can be acquired as well as potentially modified in one generation. Moreover, humans are not only inheriting from the cultural worlds around them but might act in their environments to change, purposefully, the very habitat that influences their development (e.g. Laland, Odling-Smee & Feldman, 2001). Sterelny (2012) points out how this has led
human caregivers to create increasingly complex types of “learning environments”, i.e. settings that physically, symbolically and behaviourally structure the experience for children’s development, to promote sharing of information and other forms of cultural learning. For this thesis’ concerns, the preschool can be viewed as such a structured environment. It will be argued how affordances of the physical and social environment of the preschool create conditions for scaffolding interactions for children.

This is also of vast importance as it follows that humans do not have to reinvent themselves in every generation, instead by means of cultural learning, humans can use the intersubjectively held cultural understanding (see Tomasello, Kruger & Ratner, 1993). As we will see in examples of learning in cultural settings in the thesis’ papers, children often learn both behaviours and symbolic means such as language as they develop in the preschool years. Merlin Donald (1991) sees the ability to create and use external symbols and technologies as a radical shift in human evolution, as they add an externally stored layer to our existence. This according to Nelson (1996) is mirrored in child ontogenesis where children develop from more memetic forms of imitation, to language and eventually more elaborate use of the technological and external symbolic resources of the cultures around them.

The ability to learn about the shared behaviours, symbols, to use technologies etc. was also one of Vygotsky’s major insights in to human psychology. Vygotsky highlighted that cultural influences, such as social interactions and artefacts of culture, physical as well as symbolic, can function as tools that mediate children’s experiences in the world, and that these act as driving forces in children’s learning and development (Vygotsky, 1962). On this note, the human mind is, according to Donald (2001:xiii), “a ‘hybrid’ product of biology and culture. […] It is wedded to a collective process, and the very sources of its experience are filtered through culture”.

Cole (1996:117) clarifies how artefacts in the Vygotskyan tradition are not only material objects that can be used as tools in the traditional sense, they encompass language, and “an artefact is an aspect of the material world that has been modified over the history of its incorporation into goal-directed human action”. In this sense, “humans have a double world” (Luria, 1981:35) where the material and symbolic coexist.

Language and culture are from this standpoint inextricably connected, a perspective that is echoed in the Swedish preschool curriculum. Language and culture are connected in our abilities to interact over the shared objects, tools and symbols that constitute our culture (Vygotsky, 1978; Donald, 1991; Säljö, 2005). Here, the interactional processes where humans attentively share their attention with others to interact on important matters is key for children to start participating in, and progressively grasp the shared meanings that cultures can bear (Tomasello, 1999, 2019).

One important aspect of culture is that it embeds goal-directed actions, or what might be better described as patterns of behaviours or repertoires of using artefacts (material as well as symbolic), that are normalized and institutionalized within communities etc. and can be carried out with more or less established forms of
practices (cf. Lave & Wenger, 1991; Rogoff, 2003). Patterns of behaviours that are institutionalized in such a manner can also be thought of as forming a type of cultural script (Cole, 1996) or cultural schema (Shore, 1996). Katherine Nelson (1996, 2007) notes how events, such as everyday routines, are repeated throughout our cultural lives, and that this characteristic can basically carry a scaffolding function as children come to recognize and explore the patterns of culture (e.g. a script for ‘going to restaurant’ or ‘buying groceries’). They hold a formulaic structure that works like a slotted general schema where specifics can be filled in. This is achieved mainly by communication and most elaboratively through language. These types of patterns, that make up cultural worlds, are described by Ramstead, Veissière and Kirmayer (2016) as cultural affordances, as they provide opportunities and constraints for successful action.

We will return to language development shortly. For now, we attend to the scripted characteristic of cultures, that will be most evident in Papers 1 & 4. This type of characteristic of culture makes it suitable for learning through imitation, a learning mechanism that in important ways is distinguished from a simple association mechanism and deserves more explication.

3.1.2. Cultural learning in interaction: imitation and scaffolding

A foundational mechanism for learning, and cultural learning is imitation (e.g. Tomasello, 1999). Imitation describes a wide range of behaviours varying from automatic responses to intentional acts of understanding (cf. de Waal, 1997). Imitation in human cultural learning often distinguishes itself from simple acts of mimicry, or “copying” of words and behaviours etc. Like many of the other points made in this theoretical framework, the mechanism of imitation is built on the human capacity to “mindread” (e.g. Hrdy, 2009) other people, the intentions behind their actions, and how these actions are set within cultural practices that embed them in a meaningful context (see Lantolf & Thorne, 2006: Chap. 6).

Imitation is a way of learning culturally intentional and appropriate behaviour, and simultaneously it provides a way to participate in the cultural practices of where they are used (Rogoff, 2003). Thus, it provides a form for types of apprenticeship learning (Rogoff, 1990), where children can be guided in their behaviour to more culturally appropriate manners. This type of learning resonates well with the framework developed here, as it describes cultural learning as learning and development in a specific environment, i.e. that being an apprentice not only means being told what to do, but also being guided in interactions, trying out and using the appropriate tools and artefacts. Therefore, this perspective is inherently compatible with learning in Swedish preschools, where children are encouraged to explore, try out and play, rather than being instructed.

Another well used metaphor for learning in cultural interaction is that of scaffolding. This concept was put forth by Wood, Bruner and Ross (1978) to explain the phenomena when a teacher (or even peer) provides a supporting structure for a task
3. THEORETICAL FRAMEWORK

and this structure can be subsequently internalized and the scaffold then “removed” as a supporting structure. This has productively been an example of learning and development within the Vygotskyan (1978) zone of proximal development (e.g. Lantolf & Thorne, 2006) and might also be a variant of types of apprenticeship learning (e.g. Rogoff, 1990). Here scaffolding is used within those social interactions where teachers (and sometimes peers) aid other in interaction. The metaphor of supporting structure is important here, as it will later be debated, based on arguments made in the papers, of how this concept might be used extendedly to include more types of affordances.

3.2. Language and Communication in Early Childhood

Language, its origins, and how it develops for the child, is a long-lasting debate in sciences concerned with language. I take a position in this thesis that views language as fundamentally intertwined with other communicational means, and is used to connect with, and to understand others and the world around and beyond us. I believe language to rest on several biologically endowed properties, is formative in cognitive development, used in social ways, for cultural and personal goals. This is something that will be unpacked in the following sections.

3.2.1. Language for communication in cultural worlds

Language and communication are in this sense built on what Hrdy (2009) calls “mindreading” abilities, which are used by humans for the essential need to connect with others. These are the *sine qua non* of human communication and our capacity for language. Put simply, language must be used with some kind of shared understanding of its meanings.

This connection is seen early in life in simple dyadic interaction, most basically established through eye-to-eye communication between parents or caregivers and child. At approximately nine months old, however, this expands with what Tomasello (1999, 2003) calls the ability for *joint attention*. This is the ability for the child to follow that an interlocutor intends them to look at a third object or phenomena of interest and direct their gaze towards the point of triadic interaction. In this very basic form of interaction, a complex communicational interplay may unfold, something that will be illustrated in ways throughout this thesis. This is evident, for example, in the play interactions of children when learning their second language in Paper 1 or the dialogues on concepts through an external digital tool in Paper 3.

An important consequence of our “mindreading” abilities and means of communication is what Tomasello & Carpenter (2007:124) calls *shared intentionality*:

Human children […] often are concerned with sharing psychological states with others by providing them with helpful information, forming shared intentions and attention with them, and learning from demonstrations produced for their benefit.
The emergence of these skills and motives for shared intentionality during human evolution did not create totally new cognitive skills. Rather, what it did was to take existing skills of, for example, gaze following, manipulative communication, group action, and social learning, and transform them into their collectively based counterparts of joint attention, cooperative communication, collaborative action, and instructed learning – cornerstones of cultural living.

According to Tomasello’s (2003: 141) usage-based account of language development, the two cognitive mechanisms of intention-reading and pattern-finding are core to our predisposition as humans to learn language. Because humans are in some sense able to understand other minds and communicate about their own and others’ intentions, these form the basics of human sociality and interaction around shared matters. When children reach this point in their ontogenesis, they can enter what Nelson (2007:209) refers to as the “community of minds”.

This is a point of utmost importance, that such understandings can be shared, not only across minds, but shared as commonly used symbols making humans what Deacon (1997) calls “the symbolic species”. According to Donald (1991) the ability to interact with external symbols is a foundation for culture. It builds not only on the possibility to represent an object with a symbol, but also instils us with the abilities to form ideas, create narratives, and to present abstract descriptions of the world etc.

As established previously, cultural practices hold a patterned structure, somewhat resembling scripts or schemas (Cole, 1996; Shore, 1996). Language is a part of cultural practices, but language also follows a patterned structure, from the phonological level up to syntactical (e.g. Saffran, Aslin & Newport, 1996). With the condition that human children are good at finding patterns in their external environment, language can be a part of learning assisted in this way (Tomasello, 2003). One aspect of this for consideration is that in large corpora of linguistic data, formulaic phrases are more commonplace than often thought. Wray (2002:ix) expands on two observations of the literature:

The first was that native speakers seem to find formulaic (that is, prefabricated) language an easy option in their processing and/or communication. The second was that in the early stages of first and second language acquisition, learners rely heavily on formulaic language to get themselves started.

Language is patterned in these ways, and is oftentimes tied to different types of cultural practices. It follows that language can be part of learning and development through imitation, as children can participate in a cultural world and emergently start to imitate both behavioural and linguistic patterns that they observe around them. As Ervin-Tripp (1991:95–96) states:
The process of learning through interaction with other children probably is similar in first language to observations in second-language contexts: Children imitate their models, receive corrections, copy predictable routines, figure out meanings from context, and then permute and recombine what they have learned.

Even if concisely stated, and details of this might be debated, it still holds for our purposes that these are important principles of development and learning that in many ways are valid for the first and second-language learners in the cases studied. There is, however, more to children’s ways of learning and developing, that not least is connected to how these are embodied processes that are functioning in multimodal interaction. Details of this is discussed in the next three subsections.

3.2.2. Communication, language and embodiment

There is no doubt about the importance of language in the lives of humans, however, a major point throughout all the papers of this thesis, will be a broad view of children’s communication. It will be argued that children’s perception, and other communicational means complement, adds to, and develops, in interaction with children’s emerging language. This can also be understood by considering approaches to human cognition that have emerged in recent years and that increasingly understand cognition as an embodied process (Overton, 2008; Bergen, 2012). What these lines of research have uncovered is that when using what might be termed higher-order thinking skills, such as using language to reason, the bodily experience of those descriptions is simultaneously active (e.g. Bergen, 2012), making the case for how the body is involved in all levels of human thought. Not only does this convey how the body is involved in human thought and communication, but in important ways highlight how this embodiment also is situated within cultural environments in significant ways.

This observation of how cognition is used in the world, has famously been described by Clark & Chalmers (1998) as cognition being “extended” into the environment through thinking that includes external tools. Thinking and interaction within a world is thus meaningfully situated with the environment, the tools and artefacts available that might aid such processes (Clark, 1997). This type of use of cultural tools in thinking and development is also a major theme in the cultural-historical tradition a mediational triangle, seen in Figure 1. This triangle has been used to illustrate the unmediated subject–object relation, which in this tradition was rethought by adding the culturally shaped mediating artefact as an intermediary relation. The relation illustrated with this triangle is not, however, as “simple” as putting culture in between the subject and object. Cole (1996:119) expands on this relation:

There is some temptation when viewing this triangle to think that when cognition is mediated, thought follows a path through the top of the line of the triangle that ‘runs through’ the mediator. However, the emergence of mediated action does mean that
the mediated path replaces the natural one [...] the incorporation of tools into the activity creates a new structural relation in which the cultural (mediated) and natural (unmediated) routes operate synergistically.

Figure 1. The basic mediational triangle, taken from Cole & Engeström (1993:5).

The theoretical framework developed here, makes the attempt at multimodal foci, where levels of spoken language, other means of embodied communication and the role of perception are considered. There are possible tensions in adopting a Vygotskian (1978) understanding of the world as culturally mediated and the Gibsonian (1979; Sanders, 1997) notion of direct perception of affordances. For Gibson (1979), the world is seen as containing a given set of affordances, i.e. constraints and opportunities for action, which are in a specific relation to the individual. The relation to said tools thus need not be “mediated” in the same way but provide given structures for existence and action in the world. If we take both these notions seriously, we can understand our cultural environments as always providing structures for action, but also as a changing relation of cultural and individual development as one’s abilities, relative to the cultural environment, its tools, language etc. changes.

What the above notion of the mind as embodied suggests, is that the original distinction by Vygotsky (1978) of “higher” and “lower” types of mental functioning might be conflated in more regards than have sometimes been credited in the sociocultural tradition. What is suggested here, is that for the developing child, levels of direct perception are present, and often fundamental experiences in the formation of knowledge about the world and the abstract symbols we use to describe it. A perspective on this is given by Nelson (1996) who includes Gibson’s
understanding of perception into her view of the socioculturally mediated mind. Human perception is in Nelson’s (1996, 2007) view “tuned” to the sociocultural world the child inhabits and provides a structure for different types of knowledge. This also seems to be in line with the Vygotsky (1978, 1986) enterprise where he started to underline the interrelation between everyday understanding and abstract concepts. Moreover, it has been theoretically developed in the sociocultural tradition by Wartofsky (1979), who underscores how perception is a cultural-historical phenomenon. For our purposes, it should be emphasised how these levels of experience are interrelated in the processes where humans learn and develop both as parts of mediating through culturally developed symbols, and concurrently as part of children’s emerging, highly perceptual, experiences of the world.

This has been a theoretical consideration made in accordance with the empirical materials of the thesis. When conducting analysis of visual data on young children’s learning, with multimodal methods of analysis, it is near impossible to ignore that these are blended, as will be evident in the interaction analyses that will follow in the papers. The thesis adopts the view that there is a continuum of direct perception of tools and artefacts and children’s use. In line with the metatheoretical standpoints of the thesis, there is a developing relation of children and the worlds they inhabit. Take the example of a one-year old child playing with a computer keyboard. The child has little or no knowledge about the orthographical signs on the tool, however the child can still push the buttons whimsically. Moreover, because of growth and the tuning of the fine motor skills, and through scaffolding interactions, the child can develop towards a usage that is increasingly in line with the culturally acknowledged alphabet. In this illustration, we see how there are already scaffolding potentials in the first perception of the keyboard, and the embodied use allows it to be hit in a limited number of ways (e.g. the constraints of affordances; Gibson, 1979). In scaffolding interactions with cultural actors (may it be teachers or others more adept at using the keyboard), the child’s actions can be tuned (e.g. Nelson, 1996) with the culturally appropriate way of using it.

This more embodied view seems to be fruitful for our purposes here. In Paper 2, for example, it seems to be a dynamic between children’s embodied understanding and the one expressed in culturally conventional terms (i.e. verbally explicated). In Papers 2 & 3, there are possibilities of teacher scaffolding that is created because the teacher understands children’s embodied means of communication, a type of interaction that seems to be in line with Goldin-Meadow’s (2013) understanding of the importance of gesture in the scaffolding interaction. Moreover, in Papers 1 & 4, it is children’s means of perception and understanding of patterns of culture (cf. Tomasello, 2003) that is shown to be some of their basis for understanding cultural rules and script. An understanding that works for their participation in cultural activities can work, where more language is functional in cultural situations.

A conceptual way to summarise this discussion and to understand the perceptual and linguistic pattern of culture as being patterns that essentially aid learning by
children is through what Ramstead, Veissière and Kirmayer (2016) calls cultural affordances. Considering this concept, human culture provides a way to guide people’s attention to the commonly relevant aspects of the world. These patterns are affordances for people to navigate in their world. In Paper 4, the notion of cultural affordances is used to understand how routines at preschools create such patterns, how they are common in culture and derived from other cultural practices. Importantly, as shown in Papers 1 and 4, these patterns are used by children in play, and this notion of play will be developed further in a later section.

Affordances seen in this way maintain Gibson’s (1986) view that children relate to their world through the perceived affordances but add a cultural dimension to this (e.g. Ramstead, Veissière & Kirmayer, 2016). Following Nelson’s (1996) understanding of the role of perception in cultural learning, this concerns how children’s relation to the world is changing in development. Bodily experience can thus lay a foundation for later linguistically expressed meanings (as exemplified in Paper 2). This builds on a range of means other than language that will be explained next.

3.2.3. Gesture

Gestures normally precede speech for children and the most typical usage is children pointing to objects to be named, i.e. these pointing gestures do not themselves carry meaning but are ascribed it by context (Bates, 1976; Goldin-Meadow & Alibali, 2013). Children using gestures before they learn the conventional words “suggests that human pointing and other gestures may already embody forms of social cognition and communicative motivation that are unique to the species, and that are necessary as a first step on the way to linguistic conventions” (Tomasello, 2015: 70). Gestures not only functions as means of expression but fill an important function in communicative development. This is most evident in the basic form of adult–child interaction, where the child or adult points to objects in their environment an names them.

Gestures also importantly function as a way for children to express what they cannot yet express in speech, and adults readily “translate” these into speech for the expressing child (Goldin-Meadow & Alibali, 2013). Gestures seem to bear a close connection with knowledge as they seem to be a part of the cognitive mechanisms (McNeill, 1992), and precede knowledge change, as a gesture can appear in a child’s communication months before it appears in verbal expression (Goldin-Meadow, 2003). In this manner, it can be a part of scaffolding processes as the perceptive adult might interactionally and pedagogically attend to these gestural means by which children express their emerging understanding (Goldin-Meadow, 2015).

The ways in which children use gestures in the thesis not only support the view that gestures are a way to enter the cultural conventions of language but gesturing also supersedes it. This thesis thus perhaps more accurately lends itself to David McNeill’s (2012:64) view that “gesture and speech comprise a single multimodal system”. The view is fitting as many of the children’s utterances are comprised of
speech, gesture or other bodily movements. Gestures are seen to add to and fit into the spoken language of the children under study.

More than this, gestures are also extended and integrated with the environment in meaningful ways (Goodwin, 2007). Streeck (2009) has expanded on McNeill’s (1992) concept of the gesture space. This space is the often-used space in between or in front of interactants. Streeck (2009) notes how this space is used in various ways and proposes that it is important to convey meaning. In the gesture space, Streeck (2009) notes how people use gestures in the whole of McNeill’s (1992) taxonomy, and more than mere expression, even to imagine things (i.e. “drawing” the illustration of a concept in the air). In extension of this, Danielsson (2016) has also noted how gestures can be used in instructional activities to express aspects of concepts that are not easily conveyed in language, such as movement, patterns etc.

Vygotsky (1978) holds that human hands work as a mediating tool between the child and the world. Ingold (2000) highlights how touching objects and moving around are parts of the processes in which humans perceive and gather knowledge about their environments. In these ways, hands can be used in meaningful ways for human sense-making and communicatively interacting with the world. In Paper 2, for example, we see children who are gathering understanding of an artefact by touching and building it, and attaining a sense of the concept by spinning themselves. As Goodwin (2007) proposes, gestures are coupled to an environment. Not only are the children in the thesis using gestures within the environment to express meaning, but also to gather an understanding about it.

3.2.4. Communication and attention: multimodal interaction

Interaction and how people come to understand each other is in important ways a matter of successfully communicating shared meanings within the range of possible resources, both material and semiotic, that make up the environments we interact in (Bezemer & Kress, 2016). There is an underlying problem as to how children distinguish important meaningful parts of the environment, let alone describe them with words and abstract conceptual meanings. We come a long way towards an understanding of this in the discussion of gesture and how they interplay with words. Although, humans and evermore children are confronted with what philosopher of consciousness Jeffrey Gray (2004:209) calls the “multimodal scenes” of our experience. This is fundamentally a question of attention, and the interest for the thesis is how attention is managed within interaction in the cultural environment.

This is elaborated on by Ramstead, Veissière and Kirmayer (2016) describing how there is a problem of an abundant possibility of potential objects, processes, meanings etc. to direct one’s attention to. What culture does to this process is to...
provide guidance through its scripted nature towards what is thought of as meaningful by the community, or what Ramstead, Veissière and Kirmayer (2016) calls the cultural affordances. These can be negotiated by sharing attention with others in relevant cultural practices (e.g. Tomasello, 1999).

What has been pointed out in various ways, is that such sharing of attention is a complex interactional achievement, relying on what Goodwin, LeBaron and Streeck (2011) calls forms of embodied interaction. Interaction, in this perspective pulls together an array of resources that are influential to any successful interactional achievement. For example, even simple forms of talk about an object can require forms of gaze following, deictic gesturing etc. This perspective showcases the management of attention that goes into interaction within cultural practices. Tulbert and Goodwin (2011) refers to how interaction with young children can be conceptualized as a choreography of attention, where part of the interactional achievement for an adult is to coax children’s attention to the culturally meaningful aspects of their experience. This can require direction, and re-direction of gaze through verbal cues, deictic gesture (pointing) etc.

In educational settings, this perspective is evidently relevant, as children may only be educated if their attention is somewhat focused on the educational content. In educational practices, children must direct their attention through the guidance of teachers, or other types of environmental focal points. Abrahamson and Sánchez-García (2016) terms these to be “attentional anchors”. They are cues given to children of where to successfully direct their gaze to accomplish educational tasks. These can be parts of instructional interaction, or other types of guiding through cues that the children progressively can internalize as they become more skilled in the area. As Abrahamson and Sánchez-García (2016) points out, the attentional anchors may work as a form of scaffold for the children in educational tasks.

This discussion has brought to the fore some of the more intricate aspects of the scripted nature of interaction within cultural practices. In contrast, an important part of children’s interactions are more playful in character. Paradoxically, however, children’s interaction in play builds in important ways on the scripted character of the scripted nature of cultural activities. We turn and elaborate on the theoretical understanding of children’s play used in the thesis.

3.3. Learning Culture, Communication and Language through Play

There have been many attempts to categorise and form all-encompassing theories of what enables the special character of play (e.g. Sutton-Smith, 1997). As such, several theoretical insights will be used in this section. Play, as a mode of activity can engross children, giving pleasure and joy, while at the same time not having any extrinsic goals (Hirsh-Pasek & Golinkoff, 2009). Adults play too, but the question is of why this is a so central mode of being for children in the preschool age, and what type of function might it bring. As Bjorklund and Pellegrini (2000) proposes there
must be reasons for humans’ prolonged period of immaturity, to which play is such an integral part. Bjorklund and Pellegrini (2000) suggests that play allows the developing child to adapt to the vastly variant cultural conditions in which they grow and mature. For this thesis, the interest lies within this cultural function of play, and more specifically how it might function in children’s learning at the preschool.

There have been important theoretical attempts to understand play. For Piaget (1951) play is an extension of human cognitive activities that is certainly important for children. Piaget (1951:147) states how, for the child, “play is in reality one of the aspects of any activity (like imagination in respect to thought)”. In this way, play provides an important function, as a child might enact imaginative and abstract ways of thinking before they are cognitively developed in them. Play is also a sort of extended socio-cognitive activity, where children can start from basic physical objects, and jointly start to manipulate external symbols (e.g. Tomasello, 1999, 2019).

Play is at the centre of the Swedish preschool. If we look at Figure 2 as a cursory example, we see a typical playroom from one of the studied preschools. Here two children have built a castle together, and the blue carpet surrounding it has been negotiated to represent a moat surrounding it, with a toy-shark guarding the waters.

Play is a form of activity where children enact imaginative scenarios, as Piaget (1951) claims. Children can use the objects available to them in the playroom and, as Tomasello (1999:85) puts it, “extract the internal affordances of different objects and play with them”. Thus a shark might be appropriate with the blue carpet representing water, and a generic object, like the building block, can play a number of imaginative roles, as in the building blocks for a castle in this example. What is also notable here, is that this is not play as simply the extension of one child’s imagination, but rather the cooperative achievement of two children. The result of their play is partly a creative endeavour, but also this is built on well-known narratives in our culture of protecting castles from the dangers outside.

Pellegrini (2009:228) takes this to be a main characteristic of play:

the voluntary component of play provides the motivation necessary for children to persevere at an activity, trying out a variety of behavioural routines where the means over ends, non-functional criteria mean that children are not concerned with doing something ‘right.’ The consequence of behaviours meeting all these criteria means that play behaviours are typically more variable than their more instrumental versions in terms of exaggeration, sequencing, and segmentation.
This type of behavioural flexibility seems to be an important feature of what makes play a unique mode of being for children (and to some extent for adults). Vygotsky (1967:16) states in his famous lecture on play, how “in play it is as though the child were trying to jump above the level of his normal behavior”, the mode of activity that is specific to play in this way “creates the zone of proximal development”. For Vygotsky (1978) play is at its core about children’s enactment of their imagination, the roles that children undertake in play, and the rules that these are based upon. In play\(^2\), children may use rules, rules that children can find in, among other places, the culture around them. As such, when playing “family”, children play with their understanding of the cultural patterns, or rules that they have understood about families. In this way, play can be seen, as Vygotsky (1978:103) proposes, as being “memory in action”. Children enact their understanding of cultural patterns, and as play is also a social and cultural endeavour, children’s play provides opportunities to negotiate these rules with other children’s understanding of rules. Vygotsky (1978:99) holds that imitating these cultural patterns is a basic “source of pleasure” for the child.

As play is built on children’s experiences in their cultural lives, it is not limited to imaginative narratives. Play is in the Vygotskyan tradition importantly linked with children everyday experiences. Following Nelson (2007), children develop understanding by repeated experiences of events. The child’s understanding of such events can then be taken into the play activity for further repetition. Children use

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\(^2\) Here one should note the etymological root of play in Russian. Play is close to the word game (игра), and thus when Vygotsky writes about play, there is no strict separation between the in English more free-spirited play and the more rule-bound word game.
the rules of what they experience in daily events and use them for their play activities. To further this discussion, there are several types of play represented in the thesis. In Paper 1, for example, there are clear forms of play that are external and symbolic in nature, and other types that are more bodily and tacit. However, it will be argued that the tacit dimension of play also is built on embodied ways of understanding rules. One example of this might be the limits of physical assertiveness in rough-and-tumble play (e.g. Pellegrini, 2009).

Van Oers (2013) follows in the Vygotskyan tradition that play is fundamentally built on three distinguishing principles. The principles being that play is governed by some form of rules (cultural or other), it raises children involvement, and distinguishably allows some degree of freedom in relation to those rules that are to be adhered to. In play, there seems to be less at stake for the child. Garvey (1990:167) explicates that, “although playful activities generally derive from nonplay behaviour patterns, those patterns need not be mature or complete to serve as a basis for play”.

This provides an important insight for us, as play from this perspective might provide characteristics where children can try out different sorts of experiences in a more unrestrained manner than in other cultural activities. This is what may distinguish play as a mode of activity that is suitable for learning under the conditions studied in this thesis. Pellegrini (2009:228) highlights this as the “behavioural-flexibility function” and terms it the main function of play:

children are not enacting associated behavioural routines in ways that are mere copies of the functional activity. In other words, play behaviours are not imperfect attempts to copy, or accommodate to, functional behaviours, but are instead creative, or behaviourally flexible, encounters with the world.

The structure of the preschools, both the social environment of peers and teachers, but also the physical and cultural setting that they provide, is an example of what Sterelny (2012) calls “learning environments”. Play allows children to act with some extended flexibility with regards to these structured environments. Thus, in play, children are seen to act in relation to cultural structures, such as playing with the cultural script of going to the shops, in a playful manner, or seen to use language in creative ways, as in rhyming (e.g. Papers 1 & 4).

This might hypothetically provide a mode of activity with opportunities for learning that are afforded by play’s open character for learning culturally established patterns, with all their language, symbols, rules etc. Play is notably a mode of activity that is present in all the four papers of this thesis but is more thoroughly studied as a cultural phenomenon in Papers 1 & 4, where prospected learning opportunities arise in children’s use of their second language in play, following from these characteristics of play activities.
4. Methods and Data

The following chapter is a description of the general methodological approaches of the thesis, and how it adopts a focused form of ethnographical work. The observational methods used will be described, and how the individual cases of data collection have been carried out will be detailed. Moreover, it will be outlined how analysis has been accomplished, from the initial stages in the field, to the analytical work and preparation for the finished papers. Additionally, an ethical discussion of the thesis, regarding ethics of the studies, is provided. Here there are considerations of both former, as well as current, research ethics guidelines.

4.1. Focused Ethnography

The studies compiled in this thesis can be described as forms of ethnography. Ethnography as a method stems from the classical anthropological study of people in their environments. Anthropological studies were originally conducted through prolonged periods of the researcher living with subjects of a different culture, and in other more rare cases their own culture. This type of observation is therefore referred to as participant observation, since the observer is assumed to live as well as observe with the studied culture for extended periods of time (e.g. Eriksen, 2000; Hammersley & Atkinson, 2007). One important point of ethnographical study that this thesis tries to contain, is a methodological choice to value the study of people in their contexts, at the expense of being able to control conditions. A reason for using an ethnographical method for studying children in preschool, is that, as stated previously in this thesis, the preschool is a predominant setting for a large majority of children in Sweden. To this end, as Barbara Rogoff (2003) has noted through studying children's learning and development across different cultures, there is a “cultural nature of human development”, as the settings where children grow up inseparably influences their development. The contributions of Rogoff and others (e.g. Cole, 1996) have brought to our attention that children’s development is notably affected by the types of cultural environment one is placed in. As Martin Packer (2010, 2017) has pointed out, there are longer trajectories of child development, best captured by controlled experiments and/or statistical data points over longer spans of time. Packer (2010, 2017) moreover notes, that there are also micro-levels, i.e. studies of what happens in the situated interactional encounters. For this purpose, qualitative studies are more sensitive to the interactional level and the moment-to-moment transformations of that which unfolds. These studies fall more into these descriptions of qualitative research, and this thesis relies on the assump-
tion that there is knowledge to be found in ethnographical approaches to studying children in preschool. Not only is this one of the most common settings for children growing up in Sweden, but the approach also lends itself for a more didactically relevant discussion of how things are organised in preschools.

Another methodological approach to the studies is the ethnography of communication (Hymes, 1964; Saville-Troike, 2003), in that communication in a wide sense is captured in the papers, with a focus on how language is developed in the communicative contexts of the preschool. An important note is that to the extent the studies are attempts at ethnographies of communication, the approach outlined by Goodwin & Duranti (1992:31) is favourable for being “a more dynamic view between of the relationship between linguistic and non-linguistic dimensions of communicative events.” The communicative events studied in the papers concern a wide range of children’s communicative repertoires, and how these are used and developed in conjunction with the children’s language.

Thus, there are ways that the studies in this thesis diverge from anthropological studies. This might be evident by looking at the time spent in the field. In contrast to the introductory sketch in this section of the classic ethnographies, where often years are spent in the field, in these studies time in the field is substantially more limited. Knoblauch (2005) terms this type of ethnographical approach as focused ethnography. This approach, is according to Knoblauch (2005) not necessarily a cut-off ethnographical field study, but a way of conducting ethnographical fieldwork that is afforded by some current conditions. One of these conditions is the time-constraints of conducting years of fieldwork and another is the current aid of instruments for data collection when conducting fieldwork. Knoblauch (2005) instead suggests that a shorter field visit, where focused sets of data are collected, can be a suitable form of research. He points out that the affordability and availability of instruments for collecting valuable amounts of data in relatively short time spans, equipment such as audiovisual recorders, which are also increasingly more mobile. Knoblauch (2005) terms it important that the researcher has a predisposed focus for the study, or alternatively, a strategically chosen interval of data collection. This is a fitting description for the fieldwork for this thesis, as one was conducted with purposively chosen children who were shadowed (e.g. Czarniawska, 2007) for three days (Papers 1 & 4), and in the science project (Papers 2 & 3), when the preschool was visited on certain scheduled project days.

Another researcher who has conducted and reflected on these changing conditions of carrying out ethnographical fieldwork is Sarah Pink (2007, 2015). Pink (2007, 2015) has discussed extensively how ethnography is changing under the conditions of mobility and recordability and proposes what she calls a visual- or sensory ethnography. She suggests that ethnographical work with cameras and other mobile visual means of data collection is shifting research focus in important ways. Pink (2015) points out that the research focuses under these conditions are more prone to favour a view of actors as being embodied, and their actions as embedded
within environments, and is thus, describing some consequences of what Kno-
blauch (2005) pointed to when focused data is collected in limited amounts of time.

This embodied approach to ethnography discussed by Pink (2015) also, there-
fore, aligns with the approach to children’s communication and language taken in
this thesis. Throughout this thesis’ studies, it is apparent that children often express
more than is verbally uttered and it is therefore critical that the approach taken is
amenable to behaviours that go beyond the spoken word. In the studies, the small
digital camera has played an important role in this, along with mobile audio
recorders, mobile cameras as well as a pen and notepad for taking notes.

4.2. Observational Methods

The observational methods used in the thesis need a more thorough explanation,
since all four of the studies are reliant on observational methods for gathering data.
As noted previously, observations are a main source of data collection in ethno-
graphical studies. It should also be noted, that observations, albeit in different
forms, are one of the most common tools of in science in general, as much of
science is concerned with the observable world, but also its underlying roots, causes
and laws etc. i.e. things that are not perceptible by spontaneous everyday experience
(Ladyman, 2002).

The observational method predominantly used in ethnography is, as stated
above, participant observation. This builds on the fact and understanding that the
researcher in anthropological studies sometimes participates in the community
being studied. Participating also addresses the common sense understanding that
the researcher cannot discount him-/herself as affecting the outcomes of such
observational data (Hammersley & Atkinson, 2007). This is the case when carrying
out observational studies at a preschool, where children can engage a great deal with
the researcher and any research equipment such as cameras etc. One example of this
is shown in Figure 3.
This excerpt is from the beginning of the observational period and is typical during the first day of observation at a preschool. Many of the participating children are keenly interested in the new person and any equipment that is introduced into their everyday at the preschool. Carrying out observational studies in early-childhood settings, does however seem to spawn some unique methodological conditions, as Mukherji & Albon (2015) has noted. Mukherji & Albon’s (2015) discussion of this, resonates to a high degree with my experiences during the fieldwork. At times, the children clearly address and interact with me, curious about my role at the pre-school, the equipment I have with me, or other questions that typically reflect children’s natural inquisitiveness. Nevertheless, as we will see in several examples in the papers, it is common for the children to seemingly act as if I was invisible and go about their activities without addressing me or even gazing in my direction. When the children address me, and this is of relevance for the analysis, it will be pointed out in the paper. I do not consider this problematic, or as undermining the research results, but rather, as a part of doing qualitative observational research while being reflective about it (c.f. Heath, Hindmarsh & Luff, 2010; Mukherji & Albon, 2015).

The children in preschool can range from being totally involved and the researcher being highly participant, like in the example above. As Mukherji & Albon (2015) points out, there is a scale, or rather a pendulum of the children’s engagement with the researcher, sometimes the researcher might be directly involved as above, while at other times the children seem to act as if the observing researcher is absent.

Figure 3. Children’s questions about the camera, tripod and notebook is transformed into a writing-session.
4.3. Cases and Data Collection

Since the data used in the thesis comes from two distinct periods of data collection, the two following subsections will describe them in more detail. The data collection in 2015 was initially supposed to be a follow-up to the study in 2013 of children developing Swedish as a second language, as the preschool was described as having many second language learners. On site however, few of the children could be termed second language learners in the same way as the focal children in the 2013 study, but rather being cases of bi- or multilingual children. However, the settings in both studies reflect the multilingual environments that are commonplace at Swedish preschools. Moreover, it is also in line with some of the main arguments of the thesis, in that the preschool environment and social setting allow children to participate in the preschool, its routines and activities, regardless of whether they are mono-, bi- or multilingual. Since there are differences of case selections, data collection methods and analytical focuses, the 2013 and 2015 projects will be presented separately in the subsections to come, allowing for more detailed descriptions and further transparency.

4.3.1. The 2013 study of second-language learning children

The thesis builds on data from two research projects. The first project was a focused case study of two children conducted in 2013 and the second was carried out in 2015, in a department of 21 children, during a time when the preschool was working on a science project about spinning.

The data collection in 2013 was conducted as part of a thesis during teacher training. For this dissertation, the data was returned to and somewhat supplemented with further visits to the same environments. Furthermore, the data was re-interpreted together with Per Ledin for Paper 1, and later returned to for Paper 4. The data collection was strategically aimed at children with Swedish as their second-language. To enable this, a preschool that I previously knew from teacher training was contacted as a majority of children there were from diverse language backgrounds. Following the initial contact, a week was spent at the preschool gathering sufficient background material and parent and teacher consent for the study. It also allowed the children to adjust to me being there with a notebook and recording device.

For the purposes of the study, two children in the department were of particular interest. A boy, referred to as Dejan in the studies, and a girl, referred to as Li Na. They were of interest as they had much less exposure to Swedish during their first three years of life. Dejan migrated to Sweden with his family and then was at home with his Serbian speaking mother until starting preschool at three years of age. Li Na had recently arrived from China when the study was conducted.

Language exposure can be a tricky concept. The cases of Dejan and Li Na would meet some of the requirements for being so called sequential bilinguals as they started learning Swedish after the age of 3. This term is distinguished from that of
simultaneous bi- or multilingualism, where children learn languages at the same time (e.g. Ellis, 1997), which could be referred to more accurately as bilingual first language acquisition (De Houwer, 2009). This type of categorization is, however, increasingly hard to make, as for example Garcia & Li (2014) has pointed to in their discussions of language use in multicultural societies and how this affects education. The individual cases of this study have not tried to control the children’s exposure to the Swedish language. Instead, these, and other children featured in the papers should be seen as typical cases in societies that today are more fittingly described as what Kramsch and Whiteside (2008) calls diverse linguistic ecologies, i.e. that within a community, several languages can coexist and will also interact with other types of symbolic means of communication through which people can make themselves understood. This is another reason that these studies adopt Larsen-Freeman’s (2005) notion of second-language and multilingual development, rather than acquisition, as these are part of complex communicational processes. The reason here being that these children are not simply “lagging behind” their peers in a race to an end-state grammar, but preferably viewed as developing their Swedish along with other languages and means of communication.

The two children were followed for three days, inspired by the shadowing approach of Czarniawska (2007), i.e. that the researcher moves around with the case subjects. This mobile approach of ethnographical work is typical for visual ethnographies, as afforded by how equipment has become more portable (Pink, 2007). For this study however, a mobile audio recording device was placed on the notepad frame. As a result, audio was recorded from the activity I was facing, while at the same time I took time-stamped field notes. The field notes focused on the inaudible, i.e. behaviours, movements and gestures. It should be noted, however, that this data is inadequate for detailing micro-movements such as details of gestures etc. At the same time, this setup allowed a lot of mobility, meaning activities when the children were on the move could be recorded. The setup is also, in some situations, less obtrusive than a video camera, where for instance a tripod is used (c.f. Ellis & Barkhuizen, 2005:27). The audio recorder was turned on to record when the children engaged in an activity that could be of relevance to the study. Walks, naps etc. were not recorded and neither was anything that would interfere with the personal integrity of the children or teachers, i.e. visits to the bathroom etc. The result was approximately 5 hours of audio recordings, with synchronous field notes that were relevant for further analysis.

4.3.2. The 2015-study of the science learning group of children

In 2015, further data collection was carried out. This study was initially supposed to be a follow-up to the study in 2013, conducted in a new preschool environment, in a

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1 See for example Paper 1 (Ledin & Samuelsson, 2017:26–29), when children are moving around and playing in and around a fort in a playground.
department working with new pedagogical tools, such as computers and tablets for second-language learning, as it was so described by the municipality preschool officials. On site, however, few, if any, of the children could be assessed as sequential bilinguals, even if the department had several bi- or multilingual children. Rather, returning to the above assumptions for the 2013 study, this typifies the multilingual environment one can expect to meet at Swedish preschools in urban areas, where bi- and multilingual children might be in the majority. However, as the bilingual children were proficient in Swedish it would be misleading to also term the Papers 2 & 3 as studies in second language development, but the studies can nonetheless be viewed as taking place in a typical Swedish preschool environment with bi- and multilingual children proficient in Swedish.

On site, it also appeared that the digital tools promoted by the municipality in reality played a much more limited role in the pedagogical practice and in children’s play at the preschool. Instead, at that point, a science project about spinning was engaging the teachers and children. The activities in this project, and the play among children that it led to, took up considerable time and quickly became the new focus of the study.

The science project was scheduled to run one or two days per week, meaning that the teachers would set up an activity related to spinning in the morning and the hours after lunch and rest would be dedicated to the children’s free play. This scheduling allowed data for teacher-directed, guided-play and free-play activities to be gathered during every visit.

Before the data collection could begin, it was necessary to visit the preschool on a few occasions to provide information and obtain consent from parents, teachers and children. Background data about the science project on spinning, the children and the preschool was collected during these visits and informal interviews teachers about their practices were carried out. After this, a seven-week period followed with usually one visit per week. The visits were largely on the scheduled science project days, but visits were made on non-project days, which confirmed that the children included spinning in their play on these days.

During the visits, data was mainly collected using a video camera. Supplementary data was also collected in the form of photographs of the environments and activities, and continuous informal interviews with the teachers were conducted, in particular to understand their pedagogical goals as the science project progressed. Most of the recordings were made inside, as ethically problematic scenarios could arise outside where the children for whom we had consent to study mixed with other children. The recordings were on the whole made from a corner or side-angle of the room. This was to capture as much of children’s activity as possible and include a view of the environment and its artefacts, as these were presumed to play a role in the activities. Approximately 7 hours of relevant video recordings from the spinning project were chosen for further analysis together with the field notes and around 150 pictures of the environment and activities.
4.4. Data, Coding, and Initial Analysis

The type of inquiry that has gone into these studies should be viewed as an abductive process. This type of reasoning stems from Peirce (1955) and other contemporaries, such as Svennevig (2001), who proposed abduction as a common type of reasoning in studies of interaction. For Peirce (1955), abduction is a way of reasoning by “inference to the best explanation” available that can lead to new knowledge about human behaviour. Since humans can always be directed by some spontaneity, something more than a strict deductive reasoning can be of use. For these studies, this simply means that the line of inquiry is neither simply inductive nor deductive. Rather, as Muthukrishna & Henrich (2019) points out, abduction describes science as when theory informs empirical considerations, and that empirical findings influence theory. As such, the working process is informed both from inductive reasoning with the empirical material and through finding a functional theoretical frame with enough explanatory power for the study. Some theoretical foundations have been set, for example, the metatheoretical value of interaction as being foundational (see section 3.1.), while other theoretical choices, such as the influence of gestures, have come later in the research process. This abductive process will be later described in more detail and is akin to the pragmatic view described by Chang (2017), where science works by trying to establish a pragmatically sound coherence of the objects of study through the available means.

By this standard, it should be stated how initial coding begins in the field. In the 2013 data collection, the children studied were chosen in the initial visits to the preschool. Even at this stage, a rough structure of the children’s days, their routines and the play they engaged in could be identified. For the 2015 study, it became clear, during data collection, that the science project was one of several worthy foci for study.

When the actual data collection starts, a period of sense-making, where initial observations and rough coding is tried, to match to theoretical frameworks and relevant fields of research literature. Here, it is crucial to single out types of communicative events (e.g. Saville-Troike, 1997) that might be of interest. More specifically, it is useful to look for what Goffman (1963) calls forms of focused interaction, where participants seem to be attentive or are cooperating with one another (or focused on accomplishing a solitary task).
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Figure 4 is a screenshot of a video-recording that has been entered into software used for qualitative analysis named NVivo. The recording, which is more than 30 minutes long, features different activities that the children engage in. The children start by looking at some photographs on a projector screen showing their constructed spinning tops and activities about spinning, this later turns into further construction of and play with spinning tops. When coding the recording, nine categories of behaviours relating to the spinning project are noted. Some, like the mention of the word spin* (snurr*) is used repeatedly, as is the gesture when the children spin their hands. As can be seen here, sometimes their behaviours overlap and sometimes they do not. This is an example where such coding has inspired further investigation.

This can also be achieved using other software or with pen and paper. The NVivo software is, however, convenient. For example, codes automatically add up during a project, meaning a behaviour that is coded can easily be checked for its frequency. In the case of Paper 2, this provided verification that a focus on gesture and movement in the children’s sense-making of spinning could be a possible focus for a publication, as it was frequently reoccurring in the data.

In the 2013 project, where coding was completed on paper and later in Word, the material was more conveniently coded at the level of activity (play, non-play, categories of routines etc.) and for some behaviours (e.g. verbal, non-verbal). However, the same type of detail, as in the 2015-coding, in overlapping behaviours and activities, was unobtainable. In Figure 4, for example, we see an episodic code for the visual character of the activity, one code tracking where spinning and the digital interface overlap, one code tracking gestures related to spinning and two codes indicating either formal, scaffolding or informal types of interaction between teachers and children. This demonstrates how the software can better keep track of several levels that could be important for the analysis.
Here, methodological notions such as Roth’s (2005) use of metaphors for “zooming” and “focusing” on details in the material can be applied. Where relevant aspects for the research project seem to emerge, it is possible to “zoom” in on these activities, and then “focus” by producing more detailed transcriptions that might include gesture, movement and language use by the children etc. At this stage, the aims of the research become clearer and a functional theoretical frame for the studies can be drawn out.

As Clark (1996) pointed out, language use typically emerges in joint activities where participants have, or are, establishing common ground for what type of activity they are engaging in. Thus, human communication can be analysed at different levels, where interactional patterns, communication and language use can converge or diverge from the cultural norms. As such, there is a level of immediate micro-level interaction between children and teachers in the papers. These are set within meaningful cultural and educational patterns. The children in Paper 1, for instance, might play serving and drinking coffee, but this household scene is afforded by the setup the teacher has created to enable such play. Perhaps it because this setting has been regarded as an important cultural activity, the children might learn more about it through play. In Paper 2, the preschool adds materials and arranges activities related to spinning as the science project progresses. The children enjoy these activities, but there is an educational level of analysis where these objects and activities can be seen as being set within the science project and its related educational goals, i.e. that the teachers are not only adding the materials and activities for the children’s enjoyment, but also as means to fulfilling educational goals.

In Paper 4, this coding of activities has been used to merge data from the data collections in 2013 and 2015. This method of working with qualitative data has similarities with meta-ethnographies (cf. Noblit & Hare, 1987), where ethnographical data is compared, and conclusions are drawn from ethnographical cases. The study is best described in terms of what Sandelowski & Barroso (2006:3) calls a qualitative synthesis, a methodological approach that has grown out of the increasing interest in qualitative studies and the simultaneous “relative undervaluation and underutilization of the findings of qualitative research”. From the coding of activities (and my own experiences) it was clear that many of the activities are performed routinely at the preschools. Some of these routines are iterated daily, such as circle time, mealtimes and forms of free play. Thus, these lent themselves to become the foci of study for Paper 4.

4.5. Methods of Transcription and Analytical Procedures

Multimodality has in recent years given rise to a growing interest in research and although there are attempts for standardized transcription standards for quantitative purposes (e.g. Wittenburg et al., 2006), there is a multitude of alternatives and approaches for how to transcribe and present multimodal research qualitatively (e.g.
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Jewitt, 2014). A possible reason for this, is that there is a myriad of legitimate choices for what type of expression the analysis can take as a primary focus (e.g. gestures in general, specific gestures such as pointing, artefact use, or gaze etc.). The researcher must choose what type of mode is the predominant for the analysis. These choices have not been simple or straightforward but are of utmost importance in the analytical work of all the papers.

Since the children in these studies communicate when they are trying to understand and use a language or concepts that they do not fully grasp, the non-verbal means of expression and communication have been of key importance in the analytical work. The transcriptions of Goodwin & Goodwin (M. Goodwin, 1990; C. Goodwin, 2000, 2007) have influenced ways of approaching the analysis and have been especially influential in the transcriptions presented in Papers 2 & 3. The Goodwin’s pioneered how language, gesture and environment interlace in communication, for example, in M. Goodwin (1990, 1995) studies of children’s games in the playground highlight how environmental cues, gestures and embodied resources such as the tone of voice are used in meaningful expression.

What has been helpful from these studies is how details of interaction, based on the analytical work, can be foregrounded in the transcriptions. In addition, the processes of the analytical and transcription work should be seen as using an abductive approach. For example, in the initial analysis of Paper 2, the saliency of gesture and bodily movement depicting spinning became evident during the initial analysis. After the coding in NVivo had highlighted gestures as a possible area of interest, a following period of reading theoretical and empirical literature and adopting different styles of analysis were experimented with to close in on a plausible understanding of what the aim of the project might be, how to frame it, and how this resonated with evidence in the children’s interactions.

As all the communicative situations, where children begin to use their second-language and conceptual vocabulary is considered, it is sometimes a matter of a fleeting unit of analysis, where different parts of the environment and its cues or artefacts can become relevant when interwoven in interaction. This resonates with Duranti & Goodwin’s (1992) notion that language and environments are interlinked in ways that are meaningful and should influence the analytical work.

For all the studies, but especially Papers 2 & 3, Streeck’s (2009) and McNeill’s (1992) work on a gesture space has been advantageous for the analysis. This concept, as Streeck (2009) developed it, concerns how people create meaningful conversations by including the deictic space in front of them. In this space, people can use gesturing and the visible properties of the environment to aid understanding. Deictic gestures, such as pointing, in several instances become relevant and are a salient feature in some of the work in language development that this thesis draws from (e.g. Tomasello, 1999, 2003), and through these analytical methods it is interpreted how they are employed in interaction.
The templates used for transcriptions are my own, albeit inspired by the named authors. In Papers 1 & 4, a template inspired by Jordan and Henderson (1995) has been used, as it provides a common means to show transcriptions of both verbal and non-verbal behaviour, where data frames from video are lacking for all examples. Norris’ (2004) approach to multimodal interaction, where several activities are analysed simultaneously, has also been influential for the analysis in Paper 1.

The analytical work of recordings of children in natural contexts risk becoming complex and hard to interpret, but might at the same time have some considerable gains. Interpretations of child observations in the spontaneous activities at the preschool might, as Cole (1996:235) comments, come with the advantage of that preschool “children appear to talk in a more sophisticated way and accomplish more complex intellectual tasks in the course of spontaneous interactions than when they are being interrogated by adults.” Cole (1996) moreover points out how the very ecology of where the development takes place considerably affects it. Thus the examples provided in this thesis can be seen to offer a view of development as situated where it might occur in the preschool. What this view might offer is thus examples of affordances for learning and development the preschools offer. Moreover, these affordances includes the preschool environments, and their conditions of materials, artefacts, and how these are employed in interactions among teachers and peers. What is of interest is when these affordances promote the use of second language or concepts by the children, and thus when developmental possibilities of these might arise.

4.6. Ethical Considerations

There have been considerable ethical considerations for all the papers. The Swedish Research Council (2017:12) writes that one of the main purposes of research ethics is to engage in “questions of how people who participate in research as subjects or informants can be treated.” In the most basic form, this can be presented as a set of standards:

1. Information about the research to participants.
2. Consent from participants (or parents/caretakers for children under 15).
3. Confidentiality.
4. Ethical use of data and research.

(The Swedish Research Council, 2002)

The Swedish Research Council released a more updated discussion of these standards and issues beyond it in a 2017 publication. Although the studies in this thesis were conducted before 2017, a discussion with reference to the updated standards
will be had as well as a further discussion of considerations that might be more specific to the field of early childhood education.

No formal application was made to the local ethics board. Such an application was judged irrelevant to the studies as they do not relate to what is stated in the law (SFS: 2003:460: 3§, 4§) regarding personal data, physical or psychological interventions or the gathering of biological material from participants.

The discussion about ethical considerations when carrying out research in which children participate was highly relevant as it can be potentially tricky and sensitive, when considering possible asymmetries of power between adults and children (Einarsdóttir, 2007). This, in addition to the fact that formal consent from the participating children is not a requirement. Nonetheless, as The Swedish Research Council (2017:28) comments,

The landscape of research ethics is changing. When researchers ask new questions, use new methods and work with new materials, new research ethics issues arise. Early on, the purpose of research ethics was to keep researchers from harming or violating patients and research subjects in numerous ways in the name of science.

I think this becomes more important in research concerned with children under 15 as only parents or guardians of a child are formally required to give consent for the child to participate in the research. However, in addition to formal documents of consent from parents, I have tried to ensure that the children who participate in the study are themselves informed and understand that I intend to collect information about them. This has been undertaken by me, and perhaps more pedagogically by the teachers on occasions such as circle time.

Fortunately, my presence at the preschools has mostly been met with joy and curiosity by the children and also some, albeit minor, interest from parents. There should, however, be a more in-depth discussion beyond the mere approval of the researcher as a collector of data. As Mukherji & Albon (2015) discusses, the relation between researcher and participants might change during the project and any situation. There are additional ethical questions to consider, which are opened up by the multimodal character of the studies and how it concerns a range of human expressions. Along these lines, ethical consideration has been made in the field, on the fly, as data collection was ongoing. For example, children who seemed uncomfortable were spoken with or their teachers were asked to support them. Any instances of overly emotional responses such as crying or fighting resulted in an interrupted and deleted recording. This is to prevent the possibility that the recording of such events would add to the distress or negative emotions. Here, I think that the ethical standard should be a reflection of the methodological advancements themselves, i.e. that all of the children’s expressions that are studied also make up part of the researcher’s ethical decisions. Einarsdóttir (2007:205) argues that children should be seen more as research participants, noting, as to the ethical consequences, “The researcher has to be aware that although the children have given their consent, non-verbal actions and gestures can indicate their real view”. This opinion of how
children ought to be treated in research has been endorsed and considered before, during and after the data collection at the preschool.

Confidentiality is a major concern both during and after the fieldwork. Here, I have followed procedures so that the recorded and collected data have been stored separately from any data indicating the identity of the children. All work with the recorded data has been conducted in private, and every frame where it has been judged possible to identify the participants has been masked before showing it in any research settings such as seminars and before manuscript preparation. Fictitious names have been used in any note talking about the children, some of which have been re-used in the publications. This is to ensure that the data cannot be linked back to the individual children, maintaining the confidentiality of the personal data (cf. The Swedish Research Council, 2017:71).
5. Summary of Papers and Results

This chapter contains brief summaries of the four papers, their results and some non-exhaustive connections to previous research. The summaries are cursory, however, and for examples of interaction that the papers’ results rest on, the reader is advised to refer to the papers themselves.

5.1. Play and Imitation: Multimodal Interaction and Second-Language Development in Preschool (Paper 1)

The paper studies possible affordances for second-language development through play in preschool. It presupposes an approach of interaction as being fundamentally multimodal and embodied. The paper hinges on the understanding of humans as able to understand others’ intentions, even without sharing a common language. Imitation is a fundamental mechanism for how children come to learn according to this perspective and substantiates an important fundament in an understanding of play that stems from Vygotsky (1978), most saliently as play in many ways is built on rules that can also be imitated.

Play has been studied through the lenses of many fields of research, not least in the developmental sciences. Studies have shown the importance of play for a range of areas in children’s development, not least promoting socio-emotional skills and other factors of children’s cognitive development, and measures of language development such as vocabulary scores (see Hirsh-Pasek et al., 2009). Play in preschool settings can also be conducted more instructionally, or as what Hirsh-Pasek et al. (2009) refers to as “guided play”, where teachers can scaffold children during play sessions. What is less certain, however, is how the interactions where this is learnt are conducted, and how second-language learning children engage in them. Previous research in Conversation Analysis (CA) has shown how children with Swedish as a second language not only use code-switching in play interactions, but use several semiotic resources (e.g. Cromdal, 2001; Björk-Willén, 2007). A form of imitation, or rather mimicking or what Björk-Willén (2007) called “shadowing” was observed in multilingual children’s play at a preschool.

Ervin-Tripp (1991) argues, using an overview of ethnographical data, that play is fundamentally formulaic and as such can offer possibilities for second-language development. There have nonetheless been conflicting reports of whether play can scaffold second-language development (Piker, 2013). Logan (1991) observed enclavization that possibly impeded language exchange when children of the same first language played within groups at a preschool.
The study is theoretically underpinned by the usage-based view of language, learning and development. According to Tomasello (1999, 2003) a foundational feature of learning through imitation is seeing others as intentional actors. Children can imitate the patterns of behaviour, language and the tacit cultural rules to which those are associated. Van Oers (2013) expands on the Vygotskyan notion of play as based on imitation of cultural rules, suggesting that in play, children may try out cultural rules with greater degrees of freedom, compared to normal situations. As such, play might hold potential for children’s cultural learning.

The data was collected as part of a small-scale ethnography, where a preschool group in a linguistically diverse area was studied. After initial fieldwork at the preschool, two children were chosen for shadowing (Czarniawska, 2007), i.e. to be followed for three days at a preschool, based on the aim of the study. The two children studied were given fictitious names, Li Na (Mandarin L1, 4:0 years) and Dejan (Serbian L1, 3:9 years). Li Na arrived in Sweden and started the preschool two months before the data collection. Dejan had been attending preschool for 14 months and was previously at home with Serbian speaking parents.

To systematically analyse the data, play activities had to be singled out. This is intuitively an easy task, which analytically and theoretically, however, has been notoriously hard to define. In the study we settled with Van Oers (2013) criteria of play as activities based on rules, enabling an increased level of engagement and allowing some extensions of the degrees of freedom to the enactment of those rules.

The results indicate how the two children who were shadowed initiate and maintain play activities for brief periods of time. This seems to some extent, to be enabled through the children’s use of their emerging language use, bodily means and through the artefacts and cultural rules that the preschool provides (e.g. how the preschool’s home corner provides a structure, toys etc. for this).

The study shows possible affordances for second-language learning through guided play. Through using the heightened involvement of children in play and the relatively free character, teachers may didactically use the situations. As the teachers have a greater understanding of cultural rules and the language involved, the guided play can be used for scaffolding interactions where children and teachers can play with the cultural rules and, when necessary, provide scaffolding for children.

There are observed forms of play that are apparent as more embodied in their character (i.e. wrestling, running, forms of rough-and-tumble play etc.). The study asserts that such forms of play are, nonetheless, also built on rules. In the paper an example is given from play in a fort on the playground where it is apparent how common rules can be understood through embodied means between the children, and how such play activities are supported by the physical environment (e.g. the play fort). Even such embodied play activities are shown to afford language use in the second language, even though the linguistic repertoire seems more limited to formulaic expressions that are specific to this type of play.
5. SUMMARY OF PAPERS AND RESULTS

The study conveys how children can use, and are aided by, affordances of the preschool physical and social environments, that function as scaffolds for play-interactions in their second language (c.f. Vygotsky, 1978; Tomasello, 1999; Lantolf & Thorne, 2006). These are scaffolds to the extent that they can aid to maintain play activities, and by extension give possibilities for children to use and potentially develop their second language with other children. Moreover, these features can be didactically used by teachers in what Hirsh-Pasek et al. (2009) calls guided play. This middle ground between play and instruction not only resonates well with the character of the Swedish preschool, in the emblematic synthesizing of care and learning, but could also be used as a didactic tool in a preschool where teachers are meeting increasing linguistic diversity in many groups of preschool children.

5.2. Children’s Explorations of the Concept of Spinning in Preschool: Science Learning in Mediated Activity (Paper 2)

The paper is empirically based on data from the 2015 fieldwork of a science project about the concept of spinning at a preschool department with children aged 4–5 years.

As many of the science project activities are based around spinning artefacts such as spinning tops, a sociocultural approach has been taken, as it naturally aligns with its origins in Vygotsky’s (1978) thoughts about artefacts as mediating between a child and the objects of learning. Vygotsky (1986) also theorised about children’s conceptual development and pointed out distinctive features of different types of concepts, most distinctly between every day and scientific (or rather school-oriented) concepts. This is, at first glance, a stark distinction between areas of knowledge, but these dimensions were considered by Vygotsky (1986) as interrelated. The study uses the visual methods of ethnography to approach how this interrelation between everyday communication and scientific concepts emerge for the preschool children during the science project.

The Swedish preschool science curriculum is influenced by the pedagogical idea that children can explore natural phenomena together with their peers and teachers, or what Siraj-Blatchford (2001) calls “emergent science”. Conezio and French (2002) holds that language learning opportunities arise in the interaction with natural environments and the phenomena they encounter in them, or with simple experiments arranged by the preschool. They suggest that this is because these activities are usually highly contextualized by the teachers. This is however a best-case scenario, and in a comparison of several Swedish preschools, Sundberg et al. (2016) observes a substantial difference in what science activities preschools provide. Some preschools provided elaborate science programmes and projects, while other preschools were limited to children’s free-play explorations of nature.

How the tactile or embodied knowledge of the concepts might be important for the children is imperative for this study. Goodwin (1995) proposes that even adult science
practices use a range of communicative resources, such as gestures or other body language. Scientists also use scientific artefacts and tools in their practice, and Goodwin (1995) points out how these are integrated with the scientist communicational means. This has been confirmed again in school-settings by Roth and Lawless (2002) in the study of school student emerging language during a science project. The student communication went from gestural utterances to theoretical language during the studied science project. In the Swedish context, Larsson (2013) and Klaar and Öhman (2014) observes several learning possibilities that emerge in children’s embodied interactions with nature. In those types of situations, Pramling and Pramling Samuelsson (2001) also observes that learning opportunities arise when the children can develop their thinking about the phenomena in dialogue with teachers.

Pertaining to the function of environments and artefacts in children’s learning, Schoultz, Säljö and Wyndhamn (2001) redesigned some classic experiments in conceptual development to emphasize the importance of artefacts when children are making sense and reasons about natural phenomena. In this sociocultural tradition, knowledge is not seen as enclosed in one’s mind, but rather based on culturally accumulated knowledge that can be mediated by situations where the environments and artefacts play a significant role (Cole, 1996). Hedegaard (2007) proposes that the preschool is an example of such an environment, as it is composed of sets of artefacts and tools that are set within the institutionalised curriculum and are ultimately directed at cultural goals of education etc.

The paper focuses on interactions in such learning environments, however, the interaction among children extends beyond the linguistic. The study also relies on theories of perception, where embodied perceptions of the world and ways of communication are of fundamental importance (Finnegan, 2014; Streeck, 2009). As McNeill (1992) and Streeck (2009) point out, the close proximal space where people interact, is a space where meaningful communication takes place. This “gesture space” (McNeill, 1992) is where gesture and language converges with the field of perception and can be used when communicating, e.g. when explaining conceptual matters. The study is interesting with regards to the field of knowledge opened up by Susan Goldin-Meadow’s (2015) research on gestures, suggesting how they are not only for communication, but also function as a driving force for developing conceptual understanding.

The data was collected during seven weeks of mostly weekly visits while the preschool was most engaged with the science project. The recorded video of activities at the preschool and the supplementary data of photos, field notes etc. was then coded for activities which involved spinning, firstly on the activity level, and then as it was noted in specific language use, gestures or other behaviours.

The empirical results were divided into four salient categories: construction, competition, bodily movement and reasoning. The categories also indicate the small progression noted during the project, as reasoning activities were more common and elaborate during the later weeks of the science project.
The construction activities provide a possible source of insights for the children. These are the activities where children themselves or together with peers or teachers construct spinning artefacts of different kinds. As the project grew out of the children’s interest in a commercial spinning top, it collided with the preschool’s rule against bringing toys to the preschool. However, the preschool instead provided other materials with which the children could create their own spinning tops. Through the project, this led to an increasingly diverse set of constructed spinning tops and encouraged children to communicate about the spinning tops, their construction and properties. These types of activities were also fuelled by the children’s duelling with their constructions and moreover the teachers’ continuous addition of construction materials. These activities afford ways for children to communicate about the spinning tops and their properties in an informal way.

Other than construction and competitive duelling activities, the children engage in movement when playing that is of interest here, as they are seen to experience spinning with their bodies. This is apparent during the children’s own free-play activity where they may explore spinning by using their bodies. Thus, the body is then a tool for mediating perceptions of the concept. This type of movement is moreover also seen to be used pedagogically by the teachers where the dialogue about children’s perceptions can work as scaffolds for the children to propose hypotheses of what they are experiencing. In addition, the teachers arrange activities for this, with relatively simple means, such as filling buckets with water for children to spin and didactically steer the conversations towards reflections about spinning.

This type of spontaneous play was shown later in the science project to be the object of reasoning through dialogue between children and teachers. In the paper’s example, the teachers use pictures from the activity where the children spun buckets of water. What follows is reasoning about why water does not splash out of the buckets. It is showcased how children’s reasoning of such matters uses all their communicative means to describe spinning and the involved phenomena.

This type of activity displays how gesture, bodily movement and verbal language coincides in ways reminiscent of Streeck (2009) and McNeill’s (1992) views on communication with the use of gesture and the proximal environment. Essentially, this also presents the intriguing ways that external means are brought into children’s communication (cf. Cole, 1996; Schoultz, Säljö & Wyndhamn, 2001; Vygotsky, 1978).

In conclusion, the paper points to ways that a commercial artefact is adopted by teachers to a preschool, its environment, values and pedagogical goals. This is achieved by taking the concept of spinning, and the children’s cursory interest in the phenomena and designing the preschool’s environment and artefacts to incorporate these into activities where the children can explore the concept in different ways. These parts of the study align with some of Klaar and Öhman’s (2014) and Larsson’s (2013) results about how activities in the preschool environment can offer children experiences of phenomena to make sense of in attempts at early conceptual understanding. The study also supplies evidence of how this can be expanded
through teacher observations of children and the following redesign of the environment, and arrangement of new activities to further scaffold the children’s explorations of the concepts.

This coincides also with Hedegaard’s (2007) sociocultural model of how conceptual development can be scaffolded by the institutional environment of the preschool. The environments can be arranged to support children’s explorations of concepts and the preschool may organise activities that scaffold children towards conceptual understanding. Going back to Nelson’s (2007) theory of how children’s understanding develops through participation in repeated events. The repeated experiences of spinning afforded in the studied science project may as such promote conceptual understanding. In the study, these situations are shown to converge children’s perceptions of concepts with the more academically oriented and conventionalised conceptual language. The children use body, gesture and language intertwined when reasoning about natural phenomena (c.f. Goodwin, 2007; Streeck, 2009).

Lastly, the study adds to the research literature stemming from Vygotsky’s (1978, 1986) work on how thinking, such as conceptual understanding develops in social environments through communication. What is proposed is a variant to this tradition that includes children’s perception and communication that goes beyond mere talk (c.f. Goodwin, 2007; Wartofsky, 1979). It thus returns, to Vygotsky’s (1986) initial observation that children’s everyday understanding and later conceptual development are tightly interrelated during the preschool years. The study also empirically shows what Goldin-Meadow (2005) discovered in experiments on gesture, namely that adult attentiveness and responsiveness to children’s non-verbal ways of communication promote possibilities to scaffold children’s learning.

5.3. Multimodal interaction for science learning in preschool: Conceptual development with external tools across a science project (Paper 3)

Paper 3 is built on the same set of data as Paper 2, but instead follows the science project with the aim of studying how digital tools can be used to scaffold conceptual development.

The digital tools of most relevance in the paper are a computer connected to a projector and a screen. This set up is also apt for the project due to the children’s interest in the spinning top toy in an animated series, which is sometimes shown to the children at the preschool. This background is symptomatic of how children are growing up with and subsequently using digital tools in their lives for leisure as well as learning. There is, however, ambiguous evidence to guide how, whether, or to what extent, preschools can use such tools for effective learning outcomes (e.g. Edwards et al., 2017; Palaiologou, 2016).

The study connects with a central tenet of sociocultural research (e.g. Säljö, 2005; Vygotsky, 1978), that children learn and develop with external artefacts and tools.
Here it is presented in a contemporary setting as the teachers try to merge the children’s interest in the series and its concepts with the curriculum goals in physics that propose how children should learn about simple physical phenomena (Skolverket, 2011). The object for analysis is therefore set in the area in between children’s play worlds, noticeably influenced by popular culture, and the preschool’s learning objectives that are increasingly promoting school readiness. This scenario is also typical for the Swedish preschool, with its cornerstones of the simultaneous provision of both education and care (educare), a situation that according to the Sundberg et al. (2016) overview has resulted in an unequal diversity of what science activities preschool supplies to the enrolled children.

Siry and Kremer (2011) concludes from the study of preschool science that there is learning potential when teachers know how to direct children’s curiosity about nature. Along similar lines, Fleer, Gomes & March (2014) points out something called teacher “sciencing attitude”, which enables teachers to see possible openings for science teaching in the natural environments around the preschool as well as in the objects and artefacts that the children encounter in their everyday experiences.

As much as science in preschool is about children putting words to their experiences and developing their conceptual understanding and vocabulary, it is also about what Siry, Ziegler and Max (2012) in the ethnographic work on preschool science refers to as “doing science”. The reasoning here, goes back to the studies of Lemke (1990) who studied science discourse in school and how it extended beyond the verbal – to a range of meaning-making resources. This is echoed in Hvit Lindstrand’s (2015) study of children making sense of spinning through an interactive white board – by using talk interchanged with movement, gestures etc.

Language is an important part of understanding and expression about concepts. By using Bruner’s (1986) distinction between narrative and paradigmatic explanations, Peterson (2009) observes how children developed paradigmatic, i.e. abstract, explanations of phenomena during a project.

Conceptual development can theoretically be framed as scaffolding in socio-culturally arranged activities (Nelson, 2007). It is a complex process, that both concerns cognitive maturity, as well as how it is supported by the environment. Here it is important how conceptual development not only happens within one individual but is highly dependent on the social environment and what scaffolding interactions, artefacts and tools it might provide (c.f. Hutchins, 1995; Vygotsky, 1978). According to Gibson (1986) environments have affordances, i.e. possibilities and constraints for action, which are founded on the relations between subject and other objects that one might perceive.

From this viewpoint, the child is always set in relation to its environment. This interaction is supposed not only through language, but perception, and communication through body and gesture, or what Goodwin (2007) refers to as gestures “coupled” with the environment. The teacher’s role here, is to direct children’s
attention to relevant properties of the environment, or what Abrahamson and Sánchez-Garcia (2016) refers to as “attentional anchoring”. Such anchoring can be accomplished in relation to external artefacts, through semiotic means or even to virtual objects.

The same data set as in Paper 2 has been coded in a different way. Here, situations were selected where digital tools and artefacts are used. The metaphor of zooming and focusing on data used by Roth (2005) has been of methodological guidance. By applying this way of working, an interesting group of activities could be noted, namely those with digital tools, that seemed to play an important role in the project. These could be subsequently examined further and used for a more thorough analysis.

Through this it could be seen how interaction works where children are trying to establish an intersubjective understanding of the phenomena (e.g. Nelson, 2007; Tomasello, 2003), where children can be scaffolded towards a more paradigmatic understanding (Bruner, 1986), with the proper conceptual language involved. To observe this, an analytical transcription inspired by Goodwin (2000) has been used to highlight how communication, tools, artefacts work in co-constituting ways in complex patterns of interaction.

The results show how the children are somewhat more adept at using paradigmatic explanations and concepts towards the end of the science project. To illustrate this, the analysis is based around an early and a late phase of the project.

Narrative explanations are typical for the project’s early phase. Examples that have been sampled for the paper include a projection on a wall of an earlier activity. When encountering this situation, children make use of the gesture space (McNeill, 1992; Streeck, 2009) with converging use of gesture and speech. While the children are typically working within what Siry, Ziegler and Max (2012) calls the doing of science in preschool – they are limited to what Peterson (2009) calls the here-and-now discourse of narrative explanations of phenomena.

In the later phase of the project, the embodied ways of doing science are still present. However, the children are more prone to using conceptual language that borders the conceptual world of paradigmatic language (Bruner, 1986; Peterson, 2009). In the example given, the teacher is harnessing the children’s interest in the animated series and have them reason about relatively advanced concepts that are used by the characters in the series.

As successful as the teachers are in capturing the children’s interest and developing it, it should be noted how this is apparently challenging and that there are apparent tensions between the children’s interest in the series and the curriculum goals that the teachers are striving for. The concept of attentional anchor (Abrahamson & Sánchez-García, 2016) is therefore descriptive of much of the interactional work the teachers are carrying out in directing children’s attention in the artefacts’ details that are pedagogically relevant and challenges the children to see them in more conceptual ways of understanding.
In line with the Hvít Lindstrand (2015) study, there are apparent learning potentials about spinning in the projected space that the children can simultaneously try to make sense of and act within. It is important how this space can be used for different purposes, one of which is pedagogical. As Roseberry, Hirsh-Pasek and Golinkoff (2014) has pointed out, learning with digital tools can most purposefully be carried out within social interaction, as this would probably not have emerged without the teacher’s goal-directed interaction during the viewings. Thus, the study underscores how tools, and specifically digital tools, are usually also mediated by social interaction.

The study is set within in the sociocultural tradition (Säljö, 2005; Vygotsky, 1978), in its fundamental assumptions about tool and artefact influences on learning. The results, however, indicate in agreement with Edward’s (2017) conclusions, that digital tools are one of several coexisting tools and artefacts that complexly influences children’s learning and processes of conceptual development. Therefore, the results underscore the importance of educators contemplating the need and role for specific tools and artefacts, based on what affordances they provide, for individual children’s conceptual development and how they are most purposefully used in the didactic interaction with those children.

5.4. Environments for Imitation: Second-Language Use and Development through Embodied Participation in Preschool Routine Activities (Paper 4)

The study examines how the routine activities of preschools can support children with Swedish as a second language to use and potentially develop it. The paper rests on the premise that children, from early on in childhood, can understand others and their behaviours in cultural contexts. It is supposed also that culture has a patterned character in how cultural practices are conducted and how behaviours and language are used within these practices (Cole, 1996; Tomasello, 2003). These aspects make participation in cultural practices suitable for learning through imitation (Tomasello, 2003; Vygotsky, 1978). The paper argues that child participation in the environment of the preschool and its routine activities provide prime examples of learning of such imitable cultural patterns.

How the days are organized at preschools differs across cultural contexts and depend on political, value-based and local factors. Large-scale studies such as Chien et al. (2010) show correlations between preschools with instruction or scaffolding activities and how the children later perform in school. It cannot, however, be concluded that instruction in preschool causes later academic achievement or is comparatively better than more play-based approaches, and this is duly noted by critics such as Miller and Almon (2009) who warn against what they call an eradication of play activities in preschool and point to its importance for preschool children’s learning and development. Interestingly, Fuligni et al. (2012) found compara-
tively better results for what they call “balanced-structured environments”, i.e. pre-
schools that offer instructional or scaffolding activities, while also allotting a sub-
stantial amount of time for children’s play. This might supposedly resonate well
with how many Swedish preschools are organised and fits well with the preschools
under study here.

Williams (2001) studied Swedish preschools and concluded that the typical rou-
tines in the preschool are heavily rooted in cultural values and rules. They are es-
sentially patterned and are built on structures children may recognize. Through
participation in these routines, children can observe their peers, their verbal and
non-verbal behaviours and imitate them. A child in a similar setting was studied by
Cekaite (2007), who tracked a newly arrived girl in a preschool and noted her grow-
ing linguistic and social development during the first year, as the child increasingly
participated in the preschool routine activities.

The most common instructional type of routine at preschool is circle time.
Bustamante et al. (2018) refers to this activity as “almost universally” occurring in
preschools. While it might provide an important routine, they observe that the
linguistic challenge is often too low for children in many preschools. At the same
time, it can be a chance to learn the interactional pattern of Initiation-Response-
Evaluations, or IRE, (Mehan, 1979), that is still used in Swedish school settings
(Wallén, 2019).

Susan Ervin-Tripp (1986) concludes from her ethnographies of American pre-
schools that the routines can provide scaffolding for children’s second-language de-
velopment. This scaffolding structure can also be reused by children in play, e.g. in
“playing teacher” etc. This has been rediscovered in the Swedish context, where Björk-
Willén (2008) and Björk-Willén and Cromdal (2009) observe how circle time was re-
iterated by second-language learning children. Likewise, Cekaite and Aronsson (2004,
2005) notes how routines are playfully used by children. These types of findings
indicate knowledge about the routine structure, even before children fully participate
in them with their second language.

The paper utilizes a theoretical framework from cultural psychology, where imi-
tation is seen as a central mechanism. Imitation is in this tradition seen as reliant on
the human capacity to understand others and their intentions as part of goal-
directed cultural behaviours (Tomasello, 1999; Vygotsky, 1978). This capacity is not
least central to language development (Tomasello, 2003), and second-language
development (Lantolf & Thorne, 2006). This rests partly on the human propensity
to find patterns and make sense of their settings, and partly in that human cultures
and language can be seen as containing such patterns. Cultural routines have in this
patterned way been described in terms of cultural scripts or schemas (Cole, 1996;
Shore, 1996), and can according to Ramstead, Veissière and Kirmayer (2016) be
providing cultural affordances as the cultural patterns potentiate and limit possible
actions in social settings.
With a Vygotskyan view of play, children use such cultural patterns as frames for their play activities (van Oers, 2013; Vygotsky, 1978). What are referred to as cultural affordances in this paper are thus used by children in their play, e.g. to play shop after a cultural script for buying and selling. In play, such affordances can be used, reshaped and playfully appropriated as the children negotiate rules for their play frames or more loosely use them in their free play. Moreover, play might also be realised together with adults, or what Hirsh-Pasek et al. (2009) refers to as “guided play”.

The method was chosen to take a broader view of the preschool activities and gather data from both the 2013 and 2015 data collections. Sandelowski and Barroso (2007) proposes that qualitative data can be merged across similar settings or themes to be used in what they call “qualitative syntheses”. What followed in this study, was that relevant data for the paper came in variant forms: video, audio, photos, notes etc. When the data for different type of activities was sorted by how they corresponded to codes for activities, three types of activities that were common in both preschools were selected to be the foci of the paper: circle time, mealtimes and play.

By analysing activities of these types from the preschools, common affordances for second-language development as well as local divergences could be extracted. The types of activities are supplied with examples to illustrate how the cultural affordances can work in interaction. For this interactional level of analysis, a model based on Jordan and Henderson (1995) was used, as it permitted both verbal and non-verbal data to be merged, following the analytical purposes of the paper.

Circle time is a daily activity at the preschools where children and their teacher sit in a circle. This formation affords the teacher to see all the children and engage in face-to-face interaction with them. The teacher can address any individual child in the circle. There is reoccurring content in the circle time, such as singing, at both preschools. There are other reoccurring everyday activities, such as registration, which follow a very basic structure. Although it is basic, it nonetheless seems to allow for simple forms of interaction in the second language, even for newly arrived children. Here, one should return to the Bustamante et al. (2018) caution of the low level of linguistic input that children gain from these encounters. At the same time, circle time includes more advanced content, such as storytelling or making plans.

Meal times occur multiple times a day at the preschool. There is a clear pattern to both the routinisation of the activity and the language used. Both preschools start every lunch with a common chant. Each child has a predetermined seat, and the meals are reoccurring with a common sentence structure (pasta with X/rice with Y). This affords children with a relatively small vocabulary to predict what will be served and linguistically participate in the meal. In accordance with Kultti (2014), the results point to possibilities for second-language use in meal time situations. The children are continually engaged in the cultural affordances associated with meal times, and as interactions they seem to provide the triadic interaction between child–adult–object that Tomasello (2003) views as basic for developing early lan-
language use and understanding of the meaning of words. Moreover, from time to time, the routines are interrupted and can provide the type of linguistic play observed by Cekaite and Aronsson (2004; see also Paper 1).

A comparatively substantial part of the day at the preschools is allocated to different forms of children’s play, not least children’s so-called free play, i.e. play in the arranged environments at the preschool or its playground. There are similarities in these environments, for example, the preschools have an arranged home environment, a place with a child-sized play stove, and toys. Artefacts that allow children to play home scenes, mums-and-dads etc. Or a shop counter so children can play shop.

The environments fit with the cultural psychological lens that is applied in the paper. Children can perceive cultural affordances they encounter and use them in play (Ramstead, Veissière & Kirmayer, 2016; Vygotsky, 1978). For example, the paper gives an interactional example of how children play shop and negotiate their respective roles in play. The paper also illustrates how guided play can be used by teachers with children who have Swedish as their second language. This can be achieved by engaging these children in play, and simultaneously conducting a potentially language-developing activity.

In summary, the paper shows different ways that children with Swedish as their second language are scaffolded by their participation in the preschool environments. Several aspects of the preschool and how language is used within its routines, follow a patterned structure that potentiate children to participate with their emerging second language and affords possible language use and development. The paper introduces the term “embodied participation” to conceptualize this type of specific affordances for participation that capture both the verbal and non-verbal character of the participatory possibilities for second-language learners.

The participation within this structured type of environment, and how it is used in children’s play, also speaks for how it resonates with the Swedish preschool model. The results of the study indicate that this might provide an important function for children developing their second language and highlight some of the interrelationships between learning, instruction and different forms of play.
6. Concluding Discussion

Here, we return to the research questions posed in section 1.3. As the research questions were separated into sets of empirical and theoretical questions, this division will remain in the following two sections. The research questions are directly addressed considering the paper’s results. A third section has been added to outline the didactical implications that these results might have yielded.

6.1. Empirical Results

What possibilities or limits for second-language use and development arise in play activities in the preschool environments? What are the functions of different types of play? How can interaction with teachers contribute to children’s development of second language and concepts through play? (Papers 1, 2, 3 & 4).

The results of the papers point to several ways that play can be an aiding factor for children’s second-language use and possible development. These results are rooted in the multimodal or embodied character of play that has undergone methodological examination in the papers. In play, children use a range of expressive means that go beyond language use, and these resources are used to establish intersubjective understanding between children and/or adults. Through body language, steering of attention through gaze, and gestures, such intersubjective understanding can be grounded. In this interactional space, children can sense meanings of language and start using it. These interactions are importantly underpinned by some distinguishing characteristics of play, i.e. that it is built on some sort of rules and allow some type of freedom or flexibility to those rules (e.g. Vygotsky, 1978; Van Oers, 2013).

How the rule-governed character of play can provide opportunities for learning, might most clearly pertain to socio-dramatic forms of play, such as role-playing social functions, for example, children playing shop in Paper 4. Nonetheless, the studies also point to how more bodily forms of play can be thought of in a similar manner. For example, children under study in Paper 1, establish some form of mutual understanding of play with relatively few shared means of linguistic communication. Also, forms of rough-and-tumble play in the playground is shown to be reliant on how the children read patterns of behaviour. Through this, and simple forms of formulaic expressions, children can sustain play interactions. Although, it could be argued that the linguistic stimulation in these events is low, they never-
theless provide basic interaction through linguistic exchange between children who do not share a common level of language proficiency.

Moreover, the preschool environment is shown to supply environmental affordances that might aid children’s play. The preschool under study in Paper 1, for example, has a home environment in a playhouse, where children can interact over commonly used objects that are often represented as toy replicas, in this case a small kettle and cups for tea and coffee. The children are seen interacting with these, and where language objects is missing, the children still act with the artefacts. As such, play in this type of environment might provide additional scaffolding.

The environments also provide scaffolding in less obvious ways, as is seen in Paper 1, where the physical structures in the playground provide an advised route for children to play in through a ladder that must be climbed to reach a slide, which subsequently affords children to achieve repeated sessions of play. In Paper 2, children use their constructed artefacts and a teacher-constructed arena, to replicate the duelling of spinning tops as seen in a popular series.

To expand on this point, teachers are shown to provide scaffolding support for children in play sessions. The teachers are, as seen in Paper 2, shown to build activities on observations of children’s play sessions. In addition, teachers themselves enter children’s play sessions, as seen in Paper 1, 2 & 4. In the literature, this has been described as “guided play” (Hirsh-Pasek et al., 2009), and the term is applicable to many of the interactions seen in the papers and can favourably be used in the Swedish preschool context. Keeping the playful character, while purposefully teaching children, seems to establish a balance that can keep some of the positive features of play, whilst allowing simple forms of instruction. Thus the teachers can make us of the fine balance between exploratory and guided or instructional activities (cf. Bonawitz et al., 2011). For example, the teacher playing mealtime or coffee with the children in Papers 1 & 4, uses children’s imaginative play with the household artefacts, afforded by the preschool playroom. Since the teacher has more advanced vocabulary and understanding of the cultural rules, she can name the physical objects and what imagined objects might fit into this cultural frame, and thus she engages a negotiation of what fits into these cultural rules. Potentially, this can provide a foundation for both development of the second language and at the same time the cultural knowledge associated with it.

What affordances for second language development do the preschool’s routine activities and environments provide? How is second-language development integrated into the Swedish preschool days of play and learning? (Papers 1 & 4)

As we have established, some forms of learning can be described in terms of cultural learning, where imitation provides a key mechanism for emulation of culturally established behaviours and the associated language (Cole, 1996; Lantolf & Thorne,
The routines of the preschools can sometimes provide more teacher-guided instructional activities, as noted in Papers 2 & 3. Mostly, however, the preschool routines provide a repeated and predictable structure for children, as every day contains meal times, circle time and substantial time is allotted for children’s play activities. This provides a distinct set of cultural affordances (Ramstead, Veissière & Kirmayer, 2016) – i.e. patterns of culturally established behaviours, and language associated with cultural activities. For the newly arrived child, or any other child learning Swedish as a second language, these routines provide opportunities for participation even with a developing linguistic repertoire. This is reminiscent of Williams’ (2001) study that observed how participation was afforded by the preschool routines in a similar manner. While Bustamante et al. (2018) more critically observed that circle times fail to provide enough linguistic stimulation for many children, Paper 4 points to how such routines can provide grounds for linguistic participation for the child developing their second language. However, there is variability in this participation. Along these lines Paper 4 terms this embodied participation, as participation that might be achieved with language and other types of communicative means and because participation concerns cultural learning of a range of cultural rules that extend beyond language.

This segues into another important point, brought up in Papers 1 & 4. It seems that the cultural patterns found in the preschool can be used in children’s play activities. The patterns thus come with a positive side effect, in that patterns of language, cultural rules and behaviours that are found in the preschool’s routines can be used by the children in play. For example, when children play having coffee in Paper 1, or playing shop in Paper 4, they enact some of the cultural patterns that they routinely encounter. Thus, the results tentatively point to some possible synergetic effects of days of routines and play that might be afforded by the preschools. This might be a reason why so-called balanced preschool programmes are proven to be successful (Fuligni et al., 2012), even if this claim needs to be studied in greater detail.

Some of the conclusions concern how children develop Swedish as their second language. The theoretical lens through which this is understood highlights the same type of mechanism of cultural learning, imitation and embodied communication that could be observed for any child learning a language. The difference here is that some of the children have had less exposure to Swedish than their peers, and the studies concern how these children develop their language in this social environment. Notably, these children are not observed to engage in frequent code-switching behaviour. This could be as the newly arrived children does not share the first language of any other child in the preschool departments under study. As such, the result contrasts with some other studies (e.g. Cromdal, 2001; Logan, 1991). As such, the lack of code-switching might also reflect some of the studies’ limitations, as well as pointing to interesting potentials of children in a social setting where they only share their emerging second language with the other members of the group.
How are activities set up in the preschool environment for children to explore concepts? What are the contributions of non-verbal experiences and other communicative means to the developing conceptual language in these activities? How do tools and artefacts contribute to these processes (Papers 2 & 3)

The studies show how children explore concepts through linguistic means, but importantly also embodied means. It seems that conceptual development for the children is not only a mapping of words onto objects or phenomena. It follows from Papers 2 & 3 how preschool activities can be set up to afford children experiences of phenomena, and moreover to scaffold children towards more conceptually conscious ways of expressing those experiences. In the science project studied in Papers 2 & 3, the teachers set up a science project based on the children’s interest in spinning, since the concept is recurrently represented in a popular series. Here, there is a continuing interplay between children’s play activities and teacher-guided activities.

The teachers reorganize the preschool environment to afford children’s continued exploration of spinning and related concepts – as, for example, when children are seen using of the construction materials in constructing their spinning tops – more material is added that allow different shapes and functions. Another example is how the documentation of children’s play with spinning artefacts is later brought into instructional activities. Thus, the empirical findings reflect the possibilities of a balanced day for children, as free-play and teacher-guided activities might effectively build on one another. When some studies have pointed out the drawbacks of children’s free-play explorations of concepts (e.g. Larsson, 2013; Sundberg et al., 2016), as learning of such abstractions does not emerge from exploration on its own (cf. Vosniadou, 2007), these studies additionally point to the pedagogical affordances when free play can be integrated with teacher-guided activities.

The findings in Papers 2 & 3 point out how children’s perception and non-verbal expressions seem to be involved both in how children approach conceptual phenomena, but moreover how these are functional in the pedagogical practice. This is also of interest to the study of gesture, as it seems that children use gesture to reason about phenomena in inventive ways. An example of this is how body movement is used to strengthen gestural expressions in Papers 2 & 3. For example, a child spinning a finger can be used as what McNeill (1992) refers to as an iconic gesture. This use can map onto a word, or be used interchangeably for it in a sentence, as predicted. Moreover, there are times when the gesture is used in conjunction with bodily movement or uses of voice. One example of this is when a child in Paper 2 rocks his body and catapults their hand into the spinning gesture to represent an increasingly rapid motion. It is indeed, as McNeill (2012) later pointed out, that speech and gesture “comprise a single multimodal system”. These studies concur and add to how this seems to be an embodied process.

Gesture is important in the multimodal communication studied in all four papers. The communicational aspects of gesture and its implications for didactical
interactions are more explicitly highlighted in Papers 2 & 3. Here, the concept of the
gesture space (McNeill, 1992; Streeck, 2009), is shown to be used by the interactants.
This area, the visible space around those communicating which each other, provides
a zone where gesture and speech can be used interactively with the visual field. The
children reliantly use this in communication about concepts, and here gesture,
speech and the environment are bound in communication (e.g. Goodwin, 2007).
The uses of a pedagogical environment that aids the topic is in this regard affording
children’s communication about it. The thesis is, as a result, in alignment with
Goldin-Meadow (2015), in that teachers’ perceptiveness to children’s gestures might
provide opportunities for scaffolding. The thesis can here add that this perceptive-
ness can include a responsiveness to children’s gestures and actions in the preschool
environment.

There is direct connection with the sociocultural theme of how tools and arte-
facts are used within these developmental processes (e.g. Säljö, 2005; Vygotsky,
1978). Firstly, when exploring a physical phenomenon, such as spinning and its
governing forces, there is a clear use of different physical tools, such as the spinning
top, to explore this. Secondly, there is also an interplay with the environment in
meaningful ways, for example, spinning tops brought to the woods can only by spun
on certain surfaces, whereas a built arena at the preschool afford different types of
play and subsequently afford different types of experiences of the concept. This is
perhaps a more novel discovery, as the children meaningfully integrate artefacts and
the environment when they reason about the phenomena. This is important, as it
points to how children not only use artefacts as parts of science reasoning but might
include the physical environment in their reasoning in more unforeseen ways.
Reasoning is in this sense not only embodied, but also extended to use the afford-
ances of the environment.

More than play with physical artefacts, there is use of digital tools and artefacts
during the science project. The teachers use them to represent the phenomena for
the children and use the documented activities of children to prompt dialogue about
the concepts. Thus, as in the Roth and Lawless (2002) study of a course in physics
using digital representations, the digital tools provide visual representation of
phenomena, that can mimetically be used in gesture and provide grounds for fur-
ther dialogue and conceptual language use. The projected space seems to provide
unique affordances for this, as the children can interact with the large screen,
something notably also observed by Hvit Lindstrand (2015) in another study of
spinning.

The digital tools also grant the teachers to use a tool that is commonly used in
children’s contemporary popular culture. As such, the popular series that engages
the children is brought into the pedagogical practice. Here, however, it has been
appropriated in to curriculum goals and while this opens up for a joining of chil-
dren’s play worlds and the pedagogical goals, the appropriation notably requires the
continuous didactical direction of the teachers to be able to use it in a pedagogical
manner. This follows in line with what Danielsson (2016) has pointed out, in that the switching between modes of representation during science learning, can pose difficulties for children learning about a new concept.

Also, this is in accordance with Palaiologou’s (2016) view that the whole ecology of available technology should be considered for their potential affordances for learning – the digital tools and artefacts are some of many that the children encounter in the preschool project. There are uses for these in the science project, alongside more “traditional” physical tools and artefacts (i.e. the spinning top), and importantly these can offer complimentary pedagogical opportunities as they can be employed in interrelated ways. This suggests that both physical and digital tools and artefacts should be part of the teachers’ pedagogical decisions in how to best set up their preschool environment to aid children’s opportunities for conceptual development. From this we can conclude that teachers should consider both the choices of representational modes (c.f. Danielsson, 2016), and the use of tools for development, to be both goal-directed and interactionally appropriate.

To sum up this point, there is also a notable interrelation between the environments, how artefacts are contained within them, and how teachers engage in scaffolding interactions, by this it follows that a type of environment affords specific types of didactical situations. For example, in Papers 2 & 3, there are some types of activity that are more prone to non-verbal play, as the duelling arena in Paper 2 or the play at the fort in Paper 1, where children can play mostly with tacit rules. Another type of set-up is when the teacher projects artefacts of interest on the screen in Papers 2 & 3, and here a more educational dialogue can develop. A contribution here is the observation that different type of environmental affordances and pedagogical interaction can be used a different stages of a project (or any other type of pedagogical plan aimed at progression). This type of dynamic to the pedagogical practice might afford opportunities for learning and development that possibly maintain that the practice is within the Vygotskyan “zone of proximal development”, in a continuous feedback loop between children, their teachers, and a developing pedagogical environment.

6.2. Theoretical Contributions

*How does children’s participation within social and cultural environments aid second-language development? How does imitation play a role in this process?*

That children can understand others, as cultural actors, is established in several ways throughout the thesis. This is supported by a large body of literature from different fields that has established how humans are prone to understand others and their intentions as part of cultural actions and contexts (e.g. Hrdy, 2011; Tomasello, 1999, 2019). It seems, from the results of the papers, that preschools in important ways provides environmental and socially established structures for children’s
learning and development. This is concordant with Tomasello’s (2003) theory of development, and especially the claim that human intention-reading ability functions with a pattern-finding ability to aid understanding. This is an appealing claim, as cultures contain patterns of behaviours and rules etc. that children may act within. Moreover, as language contains levels of patterns, both structurally, and as they are used within those cultural practices, it follows of culture are rigged as what Sterelny (2012) refers to as “learning environments”, i.e. that human cultures are set up in ways that promote children to develop into adept participants. For the aims of this thesis, it seems to fit with how the structured cultural patterns presented at the preschools, can provide children with a sort of scaffold for participation. This takes place both in embodied forms, or what is called “embodied participation” in Paper 4, but also provide children with language scaffolding, as many phrases and language use is repeated throughout their days at the preschool. It thus follows that imitation can be a powerful mechanism, as it allows use and possible development of culturally meaningful and useable behaviours. Imitation is in this sense not only a mechanism for mimicking, but imitation of behaviours with underlying intentions and/or cultural meanings as they are perceived and interpreted in a context.

Children’s participation in the everyday cultural routines seem largely to be in accordance with Rogoff’s (2003) understanding of how children can observe cultural routines and bit-by-bit “chime in” as they progressively participate in cultural practices. For the newly arrived child who features in Papers 1 & 4, the simple act of repeating “here” during circle time, provides a first step in to such participation and acting during cultural routines provide responses to whether the behaviour is appropriate or not.

There are several examples of imitation in the thesis, and it should be pointed out how these vary in character. There are instances of the more direct mimicking of behaviour, for example children following each other. There are also examples where the imitation is used as part of novel linguistic behaviour. Therefore, a fair interpretation is that imitation follows a range of functions for children in the preschool age (and indeed, children over-imitate, e.g. Tomasello, 2019). Importantly however, imitation in different forms seems to provide a way for children to participate in cultural activities that might afford development of novel linguistic behaviour. In important ways this relies on the preschool’s ability to arrange both social and physical environments that provide a scaffold for children’s participation and thus may aid learning and development through imitation.

To extend this argumentation even further, the preschools seems to provide structures that can scaffold children, going beyond the cultural, linguistic and social patterns referred to previously. Beyond what are said to be cultural affordances (e.g. Ramstead, Veissière & Kirmayer, 2016), these are material and cultural properties that can aid children. They come in the form of artefacts such as toys, that might aid simple participation, but also how the environments are arranged by teachers to afford children’s participation. This adds to the notion of scaffolding adopted in this
thesis, in that an extensive view of scaffolding allows units of analysis to encompass how children are not only scaffolded by their teachers in tutoring activities (c.f. Woods, Bruner & Ross, 1976), but that the scaffolding is set inside an environment that can support and might be joined with the scaffolding processes taking place.

The thesis argues for an extensive view of the concept of scaffolding, that includes the interactional properties, first laid out by Wood, Bruner and Ross (1978), and later extended by Rogoff (1990, 2003) to include the guided forms of interaction that appear in cultural learning. More extensively, it is also argued, that scaffolding can include properties of the environment. In this way, it is seen that both the physical affordances (Gibson, 1979) and cultural affordances (Ramstead, Veissière & Kirmayer, 2016) can provide structures for cultural participation, i.e. opportunities and constraints for children’s learning and development. This is seen in how the preschools set up special types of activities and arrange the environment for the developmental goals of the children. By this, and going back to the definition of affordances as both opportunities and constraints (Gibson, 1979), these provide a set of given structural properties for action (e.g. Sanders, 1997). Thus, speaking of affordances as both material and cultural properties, we can observe how the environments and social scaffolding interactions within them provide children with structures supportive for their participation. For example, the mealtimes at the low table, in Paper 4, have the physical properties of chairs, tables etc. that allow children to participate more fully and supplies the cultural scaffolding for doing so. In this way, children can seat themselves, and during the meals point and communicate about objects on the table. Mealtime is in this way a means to participate within a culturally appropriated structure, as arranged by the preschool.

This sums up the important conclusion that there are features of the preschool that amplify these cultural patterns and by extension afford children to participate within them. A clear example is how environments, such as the household area of the preschools, are scaled in size so that children can act within them from an early age, and thus provide a functional space for the imitation of cultural behaviours that can be enacted within. The social environment is also influenced by values of care and playfulness and is thus appropriate for practices involving guided play activities. These results underscore some important aspects of how teachers might provide scaffolding for children with resources that are already commonplace at many preschools.

How are perception and non-verbal means of communication related to second-language and conceptual development? What are the roles of external tools and affordances of the environment in this process?

It seems that children’s perceptions provide an experiential understanding, necessary to establish the common ground needed for intersubjective understanding and subsequent learning and development. Here, it seems fundamental in the peda-
gogical practice to enable children to engage in forms of joint attention, either with peers, or with adults. The types of “choreographies of attention” (Tulbert & Goodwin, 2011) seen in the Paper 1, when children interact around different activities, might in successful interaction lead to instances of joint attention. Abrahamson and Sánchez-García (2016) refers to this as “attentional anchors”, which are perceptual or, as interactions, established cues to aid one’s attentional foci. In such interaction, deictic gesturing such as pointing serves an important function as it might be used as a basic gesture for establishing a shared foci, even before language is shared among interactants (c.f. Tomasello, 1999). A clear example is the use of pointing in Paper 1, when a teacher and child point to objects that can be named or be requested to be named by the child.

This basic form of pointing is indeed present in the papers, and indeed, deictic gesturing and encompass more than pointing with fingers (e.g. Enfield & Levinson, 2006), but deictic gesturing is shown to be used in more elaborative ways in the thesis. Pointing, for example, is in Paper 2 shown to be used together with a digitally projected screen when children reason. In this way, the basic deictic function is also recruited when describing conceptual matters. Pointing, is thus not only about deictic referencing to objects, but can be interwoven with children’s multimodal ways of reasoning. This can be exemplified through the children’s interplay with the projected screen in Papers 2 & 3.

Moreover, during the presumed conceptual development in Papers 2 & 3, children firstly experience the phenomena described by concepts in ways that range from the purely sensory to verbal argumentation. In the science project studied, it seems that the emerging conceptual development of the children dynamically interplays between their everyday perceptions of such phenomena and the abstract conceptual language used to describe the conceptual matters. This interplay was predicted by Vygotsky (1962), albeit within a theory that also distinguishes between higher and lower forms of mental functions. Here, it may be illuminating to look at the perceptual psychology of Gibson (1979), who understood children as having direct perception of things and processes they encounter. This relation is always established but evolves throughout the child’s development. In this way, children’s embodied experiences are always a part of a growing understanding of phenomena, however, what the child can do and understand about the relation to those objects changes. This is very much akin to Nelsons (1996, 2007) sociocultural theory, where children’s development is viewed as a perceptual attunement to the cultural practices, by the repeated participation in cultural events of similar structure. To this point, when the children reason about concepts in Papers 2 & 3, they concurrently use gestural and embodied ways of doing so alongside their emerging conceptual vocabulary.

With these conclusions, it seems plausible that children’s learning and development not only occur through speech, but children externalise their thoughts in communicative situations that include speech alongside other communication
means such as gesture. The results of this thesis point to possibilities that might arise when research within sociocultural theory considers theories of perception and embodiment. In this thesis, they provide an addition to the Vygotskyan understanding of the interrelatedness of language and thought. In this manner, it can be suggested for children’s development and learning to be seen as embodied, insofar as they encompass a dynamic between language, perception and other communicative means, and that thinking is at times extended into the environment.

Besides the use of deictic gesture such as pointing, other non-verbal means such as gesture is seen in the thesis to be used extensively when children learn about a concept. Not only can children use non-verbal means to express themselves, but these might also be a part of the learning process as Goldin-Meadow (2015) concludes from her research, as children use gesture long before they have developed words or concepts for them.

One of the possible tensions, but more hopefully, contributions, of the thesis papers has been to highlight the complementarity of the Vygotskyan (1978) view of culturally mediated interaction through the use of tools, and the perceptive ways of encountering the world of what Gibson (1979) describes as the direct perception of affordances. A bridge in this is found through contemporary theories of embodiment, where learning and development can simultaneously be matters of bodily perception and symbolic or abstract learning (e.g. Clark, 1997; Overton, 2008). This seems to be a fruitful view when studying children of this age as children’s bodily perception and communication seem to be grounding, and at interplay with how they start to use language and concepts.

Figure 5. The theoretical model developed for Paper 3. The model illustrates the interrelatedness of children's embodied doing, language use and external cultural means as foundational for possible conceptual development.

Considering this, Figure 5 (from Paper 3) presents a theoretical model of how embodied ways of doing, using language (or languaging) and tools in social contexts
might underpin conceptual development. Viewed in this way, conceptual development occurs for children in an interrelated process between children’s perceptual means of experience, communication and how it is developed through uses of language and tools of the environment. Thus, the scaffolding towards conceptual understanding occurs in both basic bodily and experiential ways along with the linguistic and increasingly abstract ways of describing those experiences.

What are the influences of play on the processes of second-language and conceptual development?

Play might influence the processes of second-language development, as play more flexibly enables children to interact in the second language. Van Oers (2013) and others (e.g. Pellegrini, 2009) point out, following Vygotsky (1978), that play is fundamentally based on rules and allows some extended freedom from those rules. This enables children to act with less regard of breaking cultural rules. This more risk-free interaction provides children opportunities to interact and negotiate the culturally intentional rules of play. As seen in Paper 1, this can provide a way to establish a common understanding of cultural rules and the words associated with them (e.g. the language, cultural rules and patterns for “having coffee”).

According to Piaget’s (1951) understanding, play allows children to externalize their thoughts and realise their imagination. As Vygotsky (1978) adds, children’s thinking, and especially how it often is externalized in play, is influenced by culture. In play, children can use the patterns of culture as a structure for their play activities. This is shown in Papers 1 & 4, where children play common routine activities found in the preschool and in other parts of the culture, i.e. the children play “having coffee” or “going to the shop”. In the papers, affordances of the environment, artefacts, along with children’s emerging cultural understanding provides a common ground for children to play. What is explored in the papers is how children can participate in such play activities, even when their vocabulary may be lacking. It can be argued that the flexibility that play seems to allow regarding behavioural and cultural rules (e.g. Pellegrini, 2009; Van Oers, 2013) in important ways functions to potentiate children’s cultural interaction with peers, and even with teachers (in play). Following this line of thought, play provides a way for children to enact, jointly negotiate and elaborate on their cultural understanding. In a multicultural context, this importantly includes the attunement of cultural understandings and expansions of linguistic repertoires to enable forms of participation in different cultural settings. For example, this is evident in Paper 1, where children incipiently try out cultural routines, without fully sharing a common language. The important finding here is how play allows children to act within those cultural routines and by which communicative means children do so. This result should be emphasised since there is inherent pedagogical potential in these encounters between children in new
environments, the cultural routines, and how they are approximated for children’s current development in the preschool practices.

If we return to the extensive view of scaffolding put forth here, that includes environmental affordances. It interrelates with the special character of play activity, in how play allows children to act with some flexibility with regards to these scaffolding structures. These conditions for scaffolding at the preschool are essentially forms of what Vygotsky (1978) calls the “zone of proximal development”, where the cultural stimulation pushes the child towards what is developmentally appropriate at the time. The results indicate that the preschool environments are in important ways built to facilitate children’s successful play, and this adds to why, as Vygotsky (1967:16) phrased it, children in play can try to “jump above the level of his normal behaviour”, as the actual environmental affordances allow the child to do so. When the child plays in the household area, the play is not only imbued with the experiential understanding and possible cultural affordances from the mealtime itself, but the toys and child-sized stove allow children to enact their play in this environment. Moreover, it seems that these properties of the preschool environment, also enable to sustained play sessions. For example, in Paper 1, the artefacts of the playroom provide ways for children to act in play sessions, whereas play through only symbolic means would probably stop. This finding reveals how preschool environments’ interplay with the character of play activity, and these play encounters, may enable children to start to use and develop the language preferred in the play group.

In a similar manner, play seems to be important for more abstract conceptual understanding as well. Papers 2 & 3 show that play provides a way for children to explore concepts, as they play in nature, with tools and artefacts that allow them to experience phenomena. If teachers are perceptive as to how children engage with natural phenomena in play, it seems to present the possibility of scaffolding by activities and environmental changes, where children potentially can develop their experiential understanding in more conceptually conscious ways. Thus, what this can add to the literature is that teachers may aid children in a dual fashion, both by observing behavioural cues that might precede learning and development (as in gestures or movement), and at the same time provide the environmental structures that can facilitate children’s expression of these, as well as stimulate new developmental possibilities.

6.3. Didactic Implications

Several of the thesis’ results point to how the dual foundations of the Swedish preschool system, as being both a setting for caretaking and education, are interrelated in important ways and some didactical points can be drawn from how play and guided play are used in the preschools studied. The teachers are seen arranging activities in the preschool based on what and how the children are playing. Moreover, teachers join children in their play, and sometimes blur the distinctions between
free play and guided play, or instructional activity. The balance of these, and how to use each of these types of didactic interaction, should be considered by teachers in relation to their group of children and their local circumstances. For example, a preschool with no newly arrived children, with no previous experience of the Swedish language, might require a different type of teacher involvement than seen in Papers 1 & 4. A teacher of a hypothetical group with many newly arrived children, with the same first language, might want to scaffold the children in play, together with majority language peers, in ways seen in Papers 1 & 4, and potentially even in collaboration with bilingual teachers.

Another line of results points to how learning and development can be described as embodied, and that this describes more than basic or sensory forms. Paper 1 shows how a teacher can read a newly arrived child’s intentions to play on a cultural theme of “having coffee”. These intentions are used for scaffolding interactions in a guided play session, and in this play opportunities for second language use and development are provided.

An important didactic conclusion comes from how preschools can be set up to promote cultural learning. The preschools allow iterated participation in routines, and some patterns of these routines can be adapted in the preschool environment so that children can use them within their play. Examples of this are mealtime, which can be enacted in play in the preschool’s household area, and similarly how children are afforded to “play shop” by the preschool environment and artefacts. A more elaborate variant of this is in the science project, where activities and environments are set up for children to experience spinning in various ways. The difference is that the goal is for children to understand the abstract phenomena underlying those experiences.

This is studied in more detail in Paper 2, where the children’s interest in a commercial artefact, a spinning top toy, is used for pedagogical ends. Instead of using the toy at the preschool, the teachers use the underlying concept of spinning to initiate a science project. By not using the toy, the children must build spinning tops themselves and this adds ways for children to experience the concept. These perceptual experiences are moreover used in the science project in attempts to develop conceptually conscious ways of understanding. The teachers arranged opportunities for play, and later activities where they can reflect on those experiences, engage in dialogue with the children and develop their conceptual language. Thus, it shows how preschools can arrange ways to create a common experiential basis for understanding among children, a basis that can be used later to develop conceptual understanding. There is a dynamic interplay between children’s play and the preschools’ pedagogical processes in Papers 2 & 3, where teacher’s observe children at play and arrange activities and the environment so that children may develop upon the understanding that they express within those play sessions.

Play is an important cornerstone of the Swedish preschool model. The studies point to different ways that play is important. Papers 1 & 4 show play as providing
an arena for children with Swedish as a second language to use it. One didactical implication from this is for preschools to create environments where children can meet in play, for example in socio-dramatic play or play based on cultural routines (e.g. mealtimes, household play, shops etc.). What is important here is that this provides possibilities for children to establish common understanding, but notably also creates a pedagogical environment where teachers can didactically interact with children in so-called guided play (e.g. Hirsh-Pasek et al., 2009). This didactical situation seems to allow children to practice their second language in a more flexible manner. Such guided play can provide children with language and a cultural understanding that might subsequently be used in free play. Here, there might be a synergistical effect that should be addressed by future research. As shown in Paper 1, relatively few means of expression can be used to sustain play. Following on from this, as highlighted by Goldin-Meadows’ (2015) findings, teachers’ responsiveness to children’s gestural and bodily behaviour can provide important cues for how to find ways of scaffolding children’s learning and development. Furthermore, when the teachers, in several of the examples, observe children acting out knowledge that they do not express verbally, they provide scaffolding interaction for children to do so. This is seen in the guided play in Paper 1, and in how the teacher notices the behavioural cues of gestures in Paper 2. This finding provides a way to understand how the zone of proximal development (Vygotsky, 1978), can function at the interactional level. Not only do these didactic interactions allow children’s play to be sustained, as in Paper 1, but they also provide a way for scaffolding at the moment when children need it, and provide linguistic stimulation that is individualized, as well as culturally useable for the child.
7. Concluding Comments and Suggestions for Future Research

The studies have in various ways pointed towards a shift of attention in research to the various visual aspects of interaction, potentially highlighting interesting details of how children develop language and concepts. These methods have empirically highlighted how children can interact in situations where they do not fully share a common language with other participants, and thus, how language can develop in an interactional and cultural context. Moreover, these methods of study have also illustrated how theoretical frameworks that promote linguistic or perceptual ways of development may coalesce in frameworks that meaningfully view human communication as embodied. This thesis is a boost for researchers considering the various forms of communicational means in their data and look beyond a priori leanings of their theoretical tools of choice.

More studies should further address how newly arrived children, learning Swedish as a second language, become participants in different types of linguistic settings. In the preschools studied in this thesis, the newly arrived children do not share their first language with others in the group. Thus, the lack of behaviours such as code-switching might be natural in this environment. While this speaks to the potential of preschool environments which enable and scaffold children towards cultural participation, the empirical findings are restricted from drawing conclusions about substantially different environments. Further studies should be directed to settings where groups of newly arrived children share the same first language and study the opportunities for second language development in those environments.

The concept of an extensive view of scaffolding that has been explored and argued for throughout the thesis can hopefully be recruited by other researchers in both other types of naturalistic environments as well as in experimental settings. It could then be more thoroughly argued if, and how, the concept plays the same role in other interactional environments. It can also then be judged to what extent the supportive structures of social interaction, and environmental affordances, interrelatedly influence processes of learning and development.

Some of the conclusions of the thesis are made on a theoretical, pedagogical or didactical level. However, the results need also to be set against recent commentary on the problems with decreasing opportunities for children’s free play, and the possible consequences (Miller & Almon, 2009; Nicolopoulou, 2010; Gray, 2013; Lukianoff & Haidt, 2018). These researchers point to different developmental, social, personal, societal and/or educational problems that may emerge due to the decline of play in children’s lives, relating especially to time and environments.
allotted for children’s free-play activities. The thesis’ results require comment in this regard, as they point to the importance of play as a special mode of activity for children, and some of the possibilities for development and learning that might arise from play activities. The results also point to some possibilities for learning and development that originate in more teacher-guided activities, and furthermore how free-play and teacher-guided activities interplay and might even work interdependently. The thesis’ results can on this ground only advise an overview of how children’s totality of experiences in preschools are balanced and point to the importance of well-rounded days for children in early childhood.
Denna avhandling är en sammanläggningsavhandling, bestående av en kompilation av fyra vetenskapliga artiklar. Denna del är en svensk sammanfattning av avhandlingenens artiklar och dess resultat.

Avhandlingen studerar förskolebarns andraspråks- och begreppsutveckling, och hur den kan stöttas genom interaktion i förskolans miljöer. Studieområdena för avhandlingen är i två av artiklarna andraspråksutveckling (artikel 1 & 4), och i resterande två begreppsutveckling (artikel 2 & 3).

Antaganden om språk i avhandlingen är till stor del byggd på användarbaserad språksyn (se Tomasello, 2003). En viktig aspekt av språk som accentueras i avhandlingen är också att det är starkt sammanbundet med andra kommunikativa färdigheter (se Goodwin, 2000), såsom gester (McNeill, 1992; Streeck, 2009) och därav kan den syn på språk som tillämpas beskrivas som multimodal.


Förutom att språket är av betydelse när vi ska förstå hur barn lär och utvecklas, är en annan aspekt som lyfts i avhandlingen kroppslig förankring (embodiment). Detta är mot bakgrund av den forskning om mänskligt tänkande (Clark & Chalmers, 1998) och utveckling (Overton, 2008; Marshall, 2014) som betonar hur kroppsliga erfarenheter och mänsklig perception av omgivningen är inbäddade i tänkandet. Ur denna syn utvecklas barn inte endast i språklig kommunikation med sin omgivning, utan även med antagandet att icke-språklig kommunikation och interaktion med omgivningen spelar en betydande roll i detta.

För att genomföra studierna har metoder som anses kunna fånga de studerade fenomenen använts. Inom etnografi har metoder växt för att kunna studera människor och deras beteenden inom kulturella kontexter. På senare år har forskare som Sarah Pink (2015) utvecklat etnografiska metoder som på ett reflekterat sätt använder sig av nya teknologier såsom digitalkameror m.m. För att beskriva de etnografiska möjligheter som dessa erbjuder har Pink (2007, 2015) namngett dessa
metoder som visuell eller sensorisk etnografi. Studierna i avhandlingen är influerade av sådana metodologiska approacher där material har insamlats med video, mobila ljudinspelare, anteckningsblock, fotografier m.m.


Denna avhandling kan sägas arbeta inom ramarna för dessa etnografiska metoder. Det visuella sättet att insamla och använda data har använts för att fånga helheten i barns kommunikation. Med dessa metoder kan mikrodetaljer som gester och som de tar sig uttryck i förskolans miljöer åskådliggöras. Data i artikel 1 och delvis 4 bygger på material inhämtat 2013, där en fallstudie av två barn gjordes. Barnen skuggades (Czarniawska, 2007), d.v.s. följes som fokusfall för materialinsamlingen, under tre dagar på förskolan. Studien kompletterades även med annat etnografiskt material och mer klassisk deltagande observation. Den andra insamlingen skedde 2015, där materialet med förskolebarnen som ingick i vetenskapsprojektet, presenterat i artikel 2 & 3, samlades in. Här har fokus varit på begreppsutveckling (artikel 2 & 3) men även på lek (artikel 4) och istället för att fokusera på enskilda barn har hela förskolegruppen följts med viss periodicitet (besök 1 eller 2 dagar per vecka, planerat med förskollärarna).


erna och hur materialet presenteras i artiklarna har genomförts på sätt som ansetts vara analytiskt givande för artikeln i fråga.

Nedan presenteras sammanfattningar av de fyra artiklarna, och sedan följer avsnitt med sammanfattade resultat och implikationer av studierna.

8.1. ”Play and Imitation: Multimodal Interaction and Second-Language Development in Preschool” (Artikel 1)


Materialet består av en skuggning (Czarniawska, 2007) av två barn i en förskolegrupp, under tre dagar. Övrigt etnografiskt arbete har också genomförts vid andra tillfällen. De två barnen som skuggades gavs i studien de fiktiva namnen Li Na (Mandarin L1, 4;0år) och Dejan (Serbiska L1, 3;9år). Li Na kom till Sverige och började förskolan två månader innan materialinsamlingen genomfördes. Dejan, i
sin tur, hade gått på förskolan i 14 månader och innan det vistats i Sverige hemma med serbiskaspråkiga föräldrar.


Resultaten av analyserna av leksituationer visar att barnen med svenska som andraspråk klarar att initiera och bibehålla lek under kortare perioder. Detta verkar i viss utsträckning kunna möjliggöras genom barnens användning av kroppsliga resurser och med hjälp av regler och artefakter som finns på förskolan, t.ex. vid lek i hushållsvrån används leksaker och köksinredning som förskolan har i detta syfte.

Studien visar även på möjligheterna med s.k. guidad lek. Genom att använda barnens engagemang kan lärarna använda sig av den ökade grad av frihet som leker, fast i didaktiska syften. Då lärarna ofta har en större förståelse för kulturella regler och ett mer utökat språk, visar sig den guidade leken bidra med potential för språkutveckling och kulturelt lärande. I den guidade leken kan pedagogerna leka med barnen och stötta barnen då barnens språk eller förståelse för den kulturella aktiviteten inte räcker till.

Det finns former av lek som är högst kroppsliga (t.ex. brottningslekar, eller s.k. ”rough-and-tumble play”). Studien visar exempel på hur även sådan lek är regelstyrda. I artikeln ges exempel på hur detta sker i lekparkens klätterställning. Här framträdde det hur regler för hur leken ska genomföras kan förstås och förmedlas kroppsligt mellan barnen, men likaså hur den kan understödas av fysiska miljön, som i ett fall där klätterställningen ger barnen en strukturerad ruttn för att leka efter. Sådan lek visar sig ge vissa möjligheter till användning av andraspråket, även om den också visar sig premiera formelartade uttryck som är bundna till lekaktiviteter (t.ex. ”en gång till”).

Studien visar således på hur barnen kan använda s.k. **affordanser**, alltså de möjligheter och begränsningar, som finns i förskolans miljö som hjälper i lekinteraktioner på andraspråket (jfr. Tomasello, 1999). Dessa kan bidra med stödstrukturer som hjälper barnen att bibehålla leken, något som i sin tur kan ge möjligheter att använda och utveckla språket i interaktion med andra barn. Här kan leken också utnyttjas didaktiskt av lärare i vad som Hirsh-Pasek et al. (2009) kallar **guidad lek** (**guided play**). Detta mellanting av lek och undervisning är inte endast väl i samklang med den svenska förskolans karaktär av både omsorg och lärande, utan även ett potentiellt kraftfullt verktyg i en vardag där förskolans pedagoger möter en stor språklig mångfald i barngrupperna.
8.2. ”Children’s Explorations of the Concept of Spinning in Preschool: Science Learning in Mediated Activity” (Artikel 2)


Barn interagerar i förskolans miljöer, och det är en utgångspunkt att sådan interaktion inte nödvändigtvis behöver vara språkelig. Studien bygger även på teorier om

Metodologiskt har förskolans projekt följts med veckovisa besök under 7 veckor. Allt inspelat och övrigt insamlad material har sedan kodats för aktiviteter där snurrande ingår som aktivitet, i språkligt uttryck, eller som gest och kroppsspråk. Med detta har analysenheten kunnat begränsas till de situationer där barnen upplever eller kommunicerar om snurrande eller relaterade begrepp.

Det empiriska materialet kunde efter kodning grovt delas in i fyra återkommande aktivitetskategorier: konstruktion, tävlande, rörelse och resonerande. Även om kroppliga uttryck och gester återkommer genomgående under de studerade veckorna, går det att utskilja en viss tendens mot att barnen använder mer verbalspråkiga uttryck för snurrande och relaterade begrepp i sina förklaringar av fenomenet.

En möjlig källa till förståelse hos barnen kommer genom de många konstruktionsaktiviteter där barnen själva eller tillsammans med varandra och lärare bygger artefakter som kan snurra av olika slag. Detta är relevant då projektet vilar på barnen intresse för en kommersiell leksaksnurra som härstammar ur en tecknad serie, men som barnen ej kan använda på förskolan pga. regler mot kommersiella leksaker på förskolan. Detta ger dock upphov till didaktiska möjligheter, då de kommersiella snurrorna är likartade, samtidigt som barnens konstruktioner kan konstrueras på en mängd olika sätt. I och med detta får barnens olika konstruerade snurror andra egenskaper, och följande även andra möjligheter att sinnligt erfara fenomenet snurrande. Dessutom ger konstruktionerna barnen möjlighet att tävla med varandra i dueller där artefakterna snurras mot varandra. Dessa ”dueller” visar sig ge tillfällen till erfarenheter och viss kommunikation, även om denna typ av lek är mer taktisk än andra aktiviteter under projektet.

Förutom byggande och tävlingar med olika snurrande artefakter ingår barnen i aktiviteter där de kroppsligen erfär snurrande i lek. Denna typ av lek sker dels i barnens ”fria lek” där de själva utforskar rörelse med sina kroppar som verktyg. Men denna fria lek kan även användas pedagogiskt av lärarna, och genom att ställa frågor till barnen under leken och efter kan den bli en ”hypotesprövande” aktivitet. Pedagogerna observerar använda till synes enkla medel, som att fylla hinkar med vattnet som barnen får snurra, för att didaktiskt styra barnens lek mot reflektioner om begreppet snurrande.

En sådan aktivitet visas kunna bli föremål för mer resonerande dialog mellan barn och lärare. I artikels exempel används digitala fotografier från då barnen snurrade hinkar med vatten. I exemplet får barnen resonera om, och varför, vatten


8.3. ”Multimodal Interaction for Science Learning in Preschool: Conceptual Development with External Tools Across a Science Project” (Artikel 3)

Artikeln bygger på data från samma projekt som artikel 2, men tar ett annat analytiskt fokus på hur digitala verktyg används under projektets gång. Artikeln följer således projektet om snurrande under 7 veckor, med syftet att studera hur de digitala verktygen dator och projektor, med tillhörande artefakter, används i stöttande interaktion.


Förskolan använder sig av barnens intresse i serien och snurrona för att skapa ett projekt om snurrande kallat ”Beyblade och centrifugalkraften”. De omvandlar således barnens intresse för Beyblade till att riktas mot läroplanens mål, som stadgar att barnen ska utveckla: ”sin förståelse för naturvetenskap och samband i naturen, liksom sitt kunnande om växter, djur samt enkla kemiska processer och fysikaliska fenomen” (Skolverket, 1998/2016: 10).


Siry och Kremer (2011) menar utifrån studier av vetenskapsprojekt i förskolan att det finns lärandemöjligheter där förskolan lyckas rikta barns intressen och vägirighet om naturen mot utforskande och kunskapsutveckling om naturfenomen.
Utifrån liknande resultat menar Fleer, Gomes och March (2014) att lärarens attityd, det de kallar ”sciencing attitude”, möjliggör att lärare hittar öppningar till lärande om naturen i alla vardagliga artefakter som barn och lärare möter runt omkring sig.


Artikeln föreslår en teoretisk modell, där barns språkande (jfr. Linell, 2016) och görande i situationer med relevanta externa artefakter och verktyg över tid kan fungera utvecklande av barns begreppsförståelse.


Resultaten i artikeln visar att barnen är något mer benägna att använda paradigmatska förklaringar och begrepp mot slutet av projektet. För att illustrera detta bygger artikeln på en ingående analys av två exempel. Ett exempel från ett tidigt skede i projektet, och ett från ett senare skede.


I det senare skede av projektet som artikeln studerar är fortfarande barnens kroppsliga sätt att uttrycka sig viktiga. Däremot är barnen mer benägna att använda begrepp och språk i sina beskrivningar av naturfenomenen. I artikeln och exempel ses barnen resonera över relativt svåra begrepp som används i den populariserade serien som streamas på förskolan.

Samtidigt som förskollärarna lyckas fånga barnens intresse för snurrande och på intressanta sätt implementera barnens intressevärldar med nya media, är det också tydligt att detta är svårarbetet. Det kan möjligt tolkas som en spänning mellan barnens intressen och styrande av dessa mot läroplanens mål. Detta kan förstås med hjälp av Danielssons (2016) iakttagelse om att växlandet mellan olika sätt att repre-
8. SAMMANFATTNING (SWEDISH SUMMARY)


8.4. ”Environments for Imitation: Second-Language Use and Development through Embodied Participation in Preschool Routine Activities” (Artikel 4)

Artikeln bygger på premissen att barn tidigt kan förstå andra, och deras beteenden, i kulturella kontexter. Detta understödjs av att kultur bygger på en viss mönster-bundenhet i hur kulturella praktiker är utformade, men även hur språk används inom dessa (Cole, 1996; Tomasello, 2003). Dessa aspekter gör kulturella praktiker lämpliga för lärande genom imitation (Vygotskij, 1978; Tomasello, 2003), och artikeln argumenterar för att barns deltagande i förskolans rutiner utgör exempel på hur förskolan består av, och framhåver, sådana imitationsbara mönster.

med detta har också tre typer av rutinaktiviteter valts ut för närmare granskning i artikel: samling, måltid och lek.


leken. Lek kan även ske tillsammans med vuxna, eller vad Hirsh-Pasek et al. (2009) kallar guidad lek (guided play).


Samlingen utgörs vanligtvis av att barn och förskollärare sitter i en cirkelformation. Detta är en position där läraren kan se samtliga barn, få ansiktskontakt med dem, och fördela ordet till enskilda barn. Samlingen består ofta av gemensamma aktiviteter, där sång är vanligt förekommande och flera barnvisor är närmast kanoniserade och återkommer mellan förskolorna. En typ av samling som återkommer i studiens material innehåller sådana högt rutinartade aktiviteter, där sånger sjungs eller närmast automatiserade uppgifter som namnupprop görs. Sådant kan visserligen fylla en viktig funktion, då de är enkla att lära sig och på så sätt möjliggör deltagande. Men samtidigt riskerar denna typ av samling att som Bustamante et al. (2018) påpekat, inte erbjuda barn språklig stimulans. Här ska dock invändas att det även finns andra typer av samlingsaktiviteter i studien, där barnen t.ex. förväntas berätta om framtida händelser eller skapa och förhandla fram karaktärer till en teateruppsättning.

Relativt stora delar av dagarna på de undersökta förskolorna ger gott om tid för barns olika former av lek, där deras fria lek, d.v.s. den tid då barnen själva får organiserar lekaktiviteter i förskolans miljö, är betydande. Det finns flera likheter i sådan miljö, exempelvis har båda förskolorna en s.k. ”hemvrå”, alltså en plats med t.ex. bord/spis där barn kan leka i en tänkt hemmiljö. På samma sätt återfinns kulturella affordanser i att båda förskolor har en plats där barnen kan ”leka affär”, genom att spela handlare och kund.


Sådan mönsterbundenhet återanvänds av barnen i lek, och pekar på lekens viktiga funktion i förskolan. Artikeln talar för en interrelation mellan barns lärande, undervisning och olika former av lek. Denna balans kan utprövas av pedagoger i arbetet med att hitta en utmanande praktik för den gällande barngruppen.

8.5. Diskussion av avhandlingens resultat

Avhandlingens resultat har delats in i tre typer av fynd: empiriska, teoretiska och didaktiska. Detta för att ge en tydlig bild av vilka bidrag som kan utmynna från avhandlingen. Kommande sektioner följer en indelning efter dessa resultat.

8.5.1. Empiriska resultat

Avhandlingens empiri kan i flera avseenden placeras inom det forskningsintresse för multimodalitet som växt fram under de senaste decennierna, och framförallt till ansatser som fokuserar på s.k. multimodal interaktion och hur mänsklig social interaktion fungerar genom byggstenar, där talspråket är en av flera pusselbitar (se t.ex. Enfield & Levinson, 2006).

Flera av avhandlingens resultat springer ur detta fokus på multimodal, och i synnerhet kroppslig interaktion. Det visas i artiklarna genom hur barn förstår varandra i förskolans olika aktiviteter och i lek på sätt som går bortom det som sägs.
I analyser i artikel 1 framkommer det hur barn kan etablera gemensam förståelse i leken utan gemensamt språk eller med hjälp av enkla fraser. Det framstår som att barn med andra barn eller vuxna kan upprätta en intersubjektiv förståelse genom kroppsspråk, blickvändningar, gester, pekande m.m. Denna typ av intersubjektiva grund har pekats ut av Tomasello (2003), Duranti (2015), m.fl. som grundläggande för kommunikation. Sådan intersubjektiv förståelse framträder t.ex. i artikel 1, där interaktion sker mellan barn som har relativt lägre språklig erfarenhet i svenska jämfört med sina jämnåriga. Det visas hur barnen interagerar med samförstånd (om än flyktigt och labilt) för lekens regler och genom användning av olika begrepp i lek.


Även i artikel 4 i avhandlingen studeras liknande, stöttande relationer mellan barn med svenska som andraspråk och interaktion i förskolans miljö. Genom artikelns fokus på förskolans rutinaktiviteter visas det hur barn, i de studerade förskolorna (och antagligen i många svenska förskolor, se t.ex. Williams, 2001; Kultti, 2013), möter tydliga mönster i sin omgivning. Sådana mönster återfinns t.ex. i förskolans samlingsaktiviteter och vid måltidssituationerna. Den rutinartade vardagen på förskolan erbjuder barnen att snabbt kunna delta i förskolans vardag. Även resultaten i artikel 4 antyder att barn relativt snabbt kan förstå hur t.ex. samlingens regler för turtagning och närvarotagning fungerar.

Som tidigare påpekats, speglar många av förskolans aktiviteter också kulturell aktivitet som återfinns utanför förskolan. Samlingen innehåller element av det interaktionsmönster barn kan komma att möta senare i skolan. Aktiviteter som mältiden innehåller kulturella mönster som är högst användbara utanför förskolan. I artikel 4 tas exempel fram på hur barn kan deltaga i sådana rutiner genom både kroppslig och språklig interaktion, något som i artikeln benämns som embodied participation.

Förskolans rutinaktiviteter visar sig även innehålla en ytterligare och inte helt självklar bieffekt. Som tidigare nämnt, är flera av rutinerna mönsterbundna och del av kulturella praktiker. I artikel 4 visas hur sådana mönster i form av exempelvis språk, regler och beteenden används av barnen i rollekar, och i synnerhet s.k.


Till gestforsknings kan avhandlingen lämna bidrag om hur gester används av barn på uppfinningsrika sätt. T.ex. använder barn i artikel 2 & 3 sin kropp för att förstärka gester, vilket ger ytterligare lager av betydelsebärande kommunikation. Detta kan dels placeras inom vad McNeill (1992) och andra kallar för *ikoniska* eller *metaforiska gester*, t.ex. i artiklarna som det finger som ofta snurras tillsammans med, eller i substitut för ordet snurr*. Men detta talar även för ett förkroppsligat sätt
8. SAMMANFATTNING (SWEDISH SUMMARY)


8.5.2. Teoretiska bidrag

Barn tar sig in i språket genom interaktion i kulturella miljöer, och avhandlingens artiklar belyser på olika sätt att detta sker mer mångfacetterat än endast språkligt. Således ger avhandlingen insikter om hur det praktiskt kan se ut i förskolan då barn tillägnar sig språk. Ett grundläggande resultat rör hur barn verkar kunna förstå andra, även om de inte nödvändigtvis delar språk med dem. Studierna belägger att barn verkar kunna läsa andras intentioner som kulturella varelser, och se kulturenbundna mönster i sin omgivning. I artikel 1 visas hur detta bygger på flera taktila färdigheter, som att styra uppmärksamhet, att peka m.m. Artikel 4 utvidgar hur sådana förmågor kan fungera stöttande för barn och deras begynnande språkliga aktiviteter i förskolans rutiner. Kulturen erbjuder igenkännbara mönster och språk som är kopplade till olika aktiviteter och som formelartade uttryck.

Ett övergripande teoretiskt bidrag från avhandlingen är således ett försök till en omvärdering av sociokulturell teori där det kroppsligt förankrade i varseblivande och kommunikation mer fullständigt kan integreras. Det finns inget i avhandlingens studier som egentligen talar emot Vygotskij teorier om språkets betydelse, men flera av avhandlingens resultat talar för viken av att inkludera fler medel än talspråk som betydande för barns förståelseskapande. Teoretiskt kastar alltså avhandlingen ljus över den perceptuella delen av barns lärande och utveckling.

Avhandlingens artiklar 2 & 3 visar hur kroppsligt förankrade resurser också används av barn för att kommunicera om och skapa förståelse för den konventionella användningen av begrepp. Vygotskij (1986) var väl medveten om den komplexa relationen mellan sinnliga upplevelser och utvecklingen av kulturellt konventionella ord och begrepp. Studierna omvärderar dock denna relation, då det inte nödvändigtvis följer att begrepp ersätter barns kroppsliga förståelse och andra uttrycksätt


8.5.3. Didaktiska implikationer

Flera av avhandlingens resultat pekar mot hur den svenska förskolans dubbla mål, som å ena sidan ska vara en plats för omhändertagande av barn då föräldrarna arbetar, och å andra sidan en plats för lärande och förberedelse för senare skolgång och liv i kunskapssamhället – på olika sätt är sammanflätade och inte nödvändigtvis i motsats till varandra.
Flera av studiernas resultat ger insikter om hur andraspråks- och begreppsutveckling är kroppsligt förankrade, och att detta sträcker sig utöver något basalt eller sensoriskt. I artikel 1 visas exempel på hur en lärare kan läsa av barnens intentioner till att leka den kulturella aktiviteten fika. Lärarens observation av denna intention kan sedan användas för guidad lek, där det ges utvecklingsmöjligheter av andraspråket.


Vad detta visar didaktiskt är att det kan finnas betydelse i att skapa en gemensam erfarenhetsmässig bas, och att sedan bygga förståelse genom denna, t.ex. i projektbaserade arbetssätt. Dessa resultat understryker viken av lärarens uppmärksamhet på barns olika sätt att erfara och kommunicera, eftersom exempelvis gester kan föregå lärande och utveckling (jfr. Goldin-Meadow, 2015). Resultaten visar även hur barnens intressen, även för t.ex. kommersiella tv-serier och leksaker, kan utnyttjas i pedagogiska syften. Här visar sig själva anpassningen av dessa till förskolan, och dess regler ge upphov till utvecklingsmöjligheter, då barnen får pröva sig fram i byggnadet av artefakternas.

Leken är en självklar aktivitet i svensk förskola, och även i många internationella motsvarigheter av förskolemodeller (om än i varierande grad, se t.ex. Miller & Almon, 2009). Studierna belägger på flera sätt lekens betydelse i förskoleåldern. I artiklarna 1 & 4 visas hur leken kan vara en plattform för barn med svenska som andraspråk för att börja använda språket. I artikel 1 visas flera didaktiska möjligheter kring barns lek. En sådan möjlighet är att skapa lekmiljöer där barn kan mötas i meningsfulla lekar, såsom över rollekar av andra kulturella aktiviteter (mat, gå att handla etc.). Dessutom visas en didaktisk möjlighet genom att som vuxen gå in i leken och stötta barnen, s.k. guidad lek. Inte minst då det i leken öppnas möjligheter genom att barnen får öva andraspråket på ett mer riskfritt sätt.

Det finns även en symbiotisk potential i detta arbetssätt. Då barnen får enkla språkliga verktyg för att leka kan barnen även få medel för mer ihållande lekin- teraktioner med lärandemöjligheter då läraren inte kan närvara. Detta visas t.ex. i artikel 1, där relativt enkla medel räcker för att barnen ska kunna leka, eller mer elaborerat i artikel 4, där barnen får förhandla fram hur det går till när de ska handla glass. I artikel 2 & 3 finns ett dynamiskt växelspel mellan hur barn leker med t.ex. olika byggmateriel och hur miljön förändras genom att material läggs till eller att nya aktiviteter skapas. Leken är inte endast en källa för lärande av det barnen för
tillfället leker – utan visas kunna vara förbundna med förskolans pedagogiska processer. Lärare kan gå in i leken och stöta barn genom interaktion, men även använda leken i lärandeaktiviteter och didaktiskt styra barnen mot pedagogiska mål. Detta är en insikt som väl överensstämmer med den svenska förskolemodellen, och som visar snillrika sätt på vilka leken kan användas didaktiskt.
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How do children start to use their second language and abstract concepts? Through observations of interaction in specific Swedish preschool environments, and how these might afford developments, this thesis will study this question further.

The work is theoretically underpinned by an understanding of child development as a relational and cultural process where children develop, in and with, environments and their affordances. It concerns how this is an interactional process involving a range of interactional and embodied means of communication that can bridge children towards common understanding.

The thesis also proposes how play is a central activity in this process and how it affords children to interact with the patterns of the cultures around them. Moreover, it examines how play activities give children opportunities to experience natural phenomena and how these can be used in preschool activities to afford the development of concepts. The outcome is a novel way to view an interaction in preschool and suggests affordances of the environment as providing supportive scaffolding for children's second-language and conceptual development.

Robin Samuelsson is a former preschool teacher. During his work with children he developed an interest in communication between children and the question of how preschools might function as settings for the development of children of varying backgrounds. This lead to the doctoral studies in Swedish at the School of Culture and Education at Södertörn University.