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Learning Words: Comparing Two-Year-Olds' Learning Success in Dyadic and Triadic Teaching Situations Embedded in Familiar and Unfamiliar Contexts

von:

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1. Introduction

Language is often cited as the one behavior that differentiates humans from animals. However, it is not the only vocal communication system used for and learned through social interaction in the animal world, although it is without doubt the most elaborate. Other examples are different communication systems of songbirds, which have been shown to learn their songs through imitation and individual variation (Baptista & Gaunt, 1997; Brown & Farabaugh, 1997; Hausberger, 1997; Nelson, 1997; R. B. Payne & L. L. Payne, 1997; West, King, & Freeberg, 1997), cetaceans and more specifically bottlenose dolphins, which are able to modify their whistles on the basis of auditory experience made during social interaction with conspecifics (McCowan & Reiss, 1997; Tyack & Sayigh, 1997), and nonhuman primates whose vocal productions undergo developmental modification – a finding that contradicts earlier studies suggesting that nonhuman primates' call structures are fixed from birth (Locke & Snow, 1997; Seyfarth & Cheney, 1997; Snowdon, Elowson, & Roush, 1997). In the late 1960s and early 1970s, researchers made use of the similarities detected in the communication systems of different species presenting a general model of vocal development in human and nonhuman species (Lenneberg, 1967; Marler, 1970). This cooperation across taxonomic boundaries decreased over time and it only re-emerged together with findings suggesting that different species learn not only vocalizations but also their pragmatics through social interaction (Doupe & Kuhl, 1999; Snowdon et al., 1997; West et al., 1997). Moreover, it has become clear that the communication systems of nonhuman mammals, birds and humans are more similar than originally hypothesized if one takes into account all three components of vocal development: production, usage and response, instead of focusing only on one of these (Seyfarth & Cheney, 1997; Snowdon et al., 1997). This led West et al. to call for bird studies that "go beyond […] songs and focus on the singers, listeners, and the contexts framing communication" (West et al., 1997, p. 41). At about the same time the concept of frames gained influence in research of language acquisition calling attention to the importance that the embedding social context has for language learning and thus for the acquisition of pragmatic knowledge (Fogel, 1993a; Tomasello, 1999, 2003). The

newly awoken interest in parallels found in the learning of vocalizations across different species especially on the level of pragmatics led to the assumption that the acquisition of verbalizations might be ruled by generic principles applicable to all species obviating the need for separate studies for "birds, marine mammals, nonhuman primates and humans as separate entities each requiring a different type of developmental process [and replacing them by] new integrative studies of vocal development in all its aspects that will involve multi-disciplinary, multi-species studies" (Snowdon et al., 1997, p. 6). This argument is even strengthened by literature on interspecies communication as one example of what Pepperberg calls exceptional learning (1997, p. 157), i.e. learning that is unlikely to occur in the normal course of events. These studies show that it is possible to establish basic communication across species, thereby confirming the assumption that both systems could be ruled by similar underlying acquisition processes. Examples are Pepperberg's own work dedicated to the teaching of a vocal, English-based code to grey parrots and the by now famous work on signing apes who learned to use American Sign Language in different, more or less social interactive contexts (R. A. Gardner & B. T. Gardner, 1989; Savage-Rumbaugh, 1991).

The present work will enter into the question whether a teaching technique used for interspecies word learning can be transferred to children learning their first language creating a specially enhancing context to teach them new words or linguistic behaviors. For this purpose I adapted Pepperberg's so called model/rival training that had given excellent results when used for grey parrots learning English words and basic interactive communicative patterns. In the first experiment, I applied the model/rival technique to word learning. For this purpose two-year-olds were taught words of different degree of difficulty in two different settings, namely through direct face-to-face instructions and in a triadic scenario in which the children were positioned as onlookers to an instructive dialog going on between two adults. Pepperberg's results implied that the children would score better in the triadic than in the dyadic condition. This type of presentation has the advantage of presenting question and answer by different interactors which could facilitate the child's analysis of the situation – and, thereby, his/her performance when faced with a comparable

situation. In the dyadic face-to-face condition, in contrast, the children have to identify question and answer from the flow of words directed to him/her by only one experimenter before being able to participate in a comparable interaction. Children's performance was tested using both, production and reception; the expectation was that the advantage of being presented with a model in the triadic condition would especially influence children's performance in the production test. Furthermore, I collected additional data on the children's lexical development, their level of shyness, and their experience with triadic or multi-party situations using birth order and daycare visit as variables to correlate them with the children's task performance. I expected children with a greater lexicon to score better than children with a smaller lexicon because they are supposed to be more advanced in their language acquisition process facilitating their acquisition of new words. Shyness was expected to have an effect on the production but not on the reception test as in the former the children needed to overcome the hurdle to speak. And children, who had more experience with multi-party interaction, were expected to profit more from triadic teaching than children with predominantly dyadic interaction experience.

In the second experiment, I chose a more pragmatic approach testing whether children would learn a new embedding frame better in a dyadic or a triadic teaching scenario. The focus of the second experiment, thus, changed from teaching the referential relation between object and label to teaching how to use a new label within a given scenario, i.e. a frame. For this purpose I manipulated the familiar question-answer-routine used in the first experiment with the aim to create a new, unfamiliar frame condition in which the children needed to learn a new linguistic behavior in order to be able to participate appropriately in the presented situation. The children were introduced to the same labels than in the first experiment but were expected to additionally learn the manner in which to produce a correct answer: In contrast to the first experiment they now were not taught to utter a label but to produce it nonverbally by placing their hand on one of three displays placed on the table before them. Just like in the first experiment, children in the triadic condition were supposed to score significantly better than children in the dyadic condition by taking advantage of the presence of a second experimenter who modeled the appropriate behavior, thereby

facilitating imitation. Again, children were tested using production and reception. Parallel to the first experiment, I collected data on children's lexical development, their level of shyness and their experience with triadic or multi-party interactions by using birth order and daycare visit as variables. In contrast to the first experiment, the children in the second experiment could solve the task presented to them without having to learn a new word. Thus, their lexical development is not expected to influence either their production or their reception performance. Shyness was not expected to have an effect on the children's performance as they did not need to overcome the hurdle to speak. Just as in the first experiment, however, children who experience more triadic or multi-party interactions as part of their daily life were expected to benefit more from the triadic teaching condition.

2. Dyadic vs. triadic word learning

For the things we have to learn before we can do them, we learn by doing them.
-Aristotle

2.1. A case of word learning in animals: The Alex Studies

The present work is based on findings by Irene Pepperberg (1997, 2002) who conducted a project on interspecies communication in which she focused on teaching words to a grey parrot called Alex. Her results were surprising regarding the amount of words and the quality of the communicative interactions she succeeded in teaching: Alex learned words for fifty objects, seven colors, number words up to eight, categories, etc. But his abilities exceeded simple naming of individual items. Instead, he was able to combine these words and gain a certain level of understanding, which enabled him to identify, classify, request or decline over a hundred items. On a pragmatic level, he was clearly able to distinguish simple speech acts and communicative roles. Therefore, it was possible to ask him questions about objects, their matter, number, color, size etc. and get correct answers in over 80% of the cases. Pepperberg achieved this outcome by paying special attention to the input she exposed Alex to. Based on social model theory (Bandura, 1971, 1989), she identified three main factors that necessarily need to be modeled in a teaching scenario in order for the parrot to succeed in learning a verbal label. These factors were (Pepperberg, 1997):

1. *Reference*, that denominates the match between the label and an object or a characteristic of an object,
2. *Functionality*, that describes the pragmatics of the label use, and
3. *Social interaction*, that alludes to the verbal and nonverbal context in which the teaching is embedded serving three major functions: social interaction can (1) direct the learner's attention to the important components, (2) emphasize commonalities in teaching situations and (3) provide insights into the motivation and consequences for a displayed action.

Pepperberg realized different studies manipulating reference, functionality and social interaction showing that the absence or limitation of any one of these components disrupts learning (1997). She, thus, created a special teaching paradigm called the model/rival technique, which optimized reference, functionality and social interaction. During the teaching sessions, Alex was located as an onlooker to a dialog taking place between two experimenters. One of the experimenters acted as tutor and the other one as model and the parrot's rival for the tutor's attention. The dialog between the two experimenters had the form of a question-answer-routine. The tutor asked for the denomination of an object and the model/rival gave either a correct or an incorrect answer. This in turn triggered either a positive, reinforcing feedback or a negative, corrective feedback. The positive feedback consisted of a verbal praise and the possibility for the learner to play with the object. The negative feedback consisted of a verbal scolding, a demonstrative interruption of eye contact and a retraction of the object. Tutor and model/rival constantly changed roles so that Alex learned to abstract the role from the person. Pepperberg's experience showed that Alex learned much better while observing the question-answer-routines than when taught directly. He failed to succeed in the absence of feedback or role reversal. Learning success was tested by checking production as well as comprehension: On the one hand, Alex was supposed to be able to take up the model's role in a comparable dialog and on the other he was expected to pick the object from a random set of different objects. Motivated by these findings, the aim of the present work is to analyze to what extent social interactive factors, that facilitate exceptional learning, can also be used to enhance learning of linguistic behavior in young children. One important result Pepperberg obtained was that parrots learn verbal labels much better when they experience them as an onlooker of a social interaction taking place between two humans than when they are taught in a direct one-to-one situation presumably because a triadic modeling is especially appropriate to maximize the level of explicitness of presenting reference, functionality and the nonverbal context framing the interaction. In the literature on children's language learning, by contrast, the possibility of learning without being directly addressed by an adult has only been addressed marginally. If, however, triadic teaching could also provide for an especially enhancing language

learning context for children it would be necessary to extend the dyadic focus on language acquisition to take into account all sorts of multi-party contexts

2.2. Triadic interaction in child studies

It is now of question whether the model/rival paradigm or the underlying principle of learning in triadic scenarios has already been investigated in child studies and if so, to what extend. Before turning to the description of the first experiment I am, thus, going to give an overview of the existing research. Most of the work calling attention to children's ability to learn language from language not addressed to them comes from sociolinguistics. Especially in the 1980s several field linguists made the point that children in many language communities learn language without obtaining much direct teaching or being scaffolded by adults adapting their speech to their needs (Heath, 1983; Ochs, 1986; Pye, 1986; Schieffelin, 1986; Schieffelin & Ochs, 1986; R. Scollon & S. B. K. Scollon, 1981). Moreover, there are also some languages with grammars that are highly influenced by pragmatic and sociolinguistic factors – one of the best known examples being Japanese (Clancy, 1986). Nevertheless, there are of course some studies on children's language learning in triads (Barton & Michael Tomasello, 1991; Dunn & Shatz, 1989; Forrester, 1988; Oshima-Takane, 1988; Oshima-Takane, Goodz, & Derevensky, 1996) although word-learning in triadic contexts has been brought into attention only recently (Akhtar, 2005; Akhtar & Herold, 2009; Akhtar, Jipson, & Callanan, 2001; Floor & Akhtar, 2006). Unfortunately, most of the lab studies on children's triadic learning skills – as studies on language acquisition in general – tend to be based on the acquisition of English by children from middle-class or upper-middle-class environments in the United States or the United Kingdom which makes it difficult to generalize their results to all languages and cultures of the world (Lieven, 1994).

2.2.1. Sociolinguistic research on triadic learning

Universally, members of every society engage in two major types of interaction, namely dyadic and multi-party interaction. However, the predominance of one or the other seems to vary depending on the culture the child is brought up in (Schieffelin & Ochs, 1986). Studies of language socialization indicate that children acquire linguistic and social knowledge in predominantly one or the other type of communicative interaction. As Schieffelin and Ochs (1986) comment, one possible outcome of these communicative arrangements is that US-American white, middle-class children, particularly first-borns, may initially be led to understand social relationships as involving only two members at any one time. This supremacy of dyadic interaction in the industrialized countries also explains the phenomenon that most analyses of communication are based on dyadic interactions. In contrast, children exposed to multi-party interaction may understand early on that social relations are complex and not restricted to only two parties. Nevertheless, it is very important to keep in mind that these cross-cultural differences in communication are not absolute. Children do not participate either in dyadic or multi-party interaction. Instead, they experience both to a different degree. Therefore, Schieffelin and Ochs (1986) proposed a variable that can be used to characterize caregiver-child discourse across social groups and across social contexts within any one group. This variable that they call *communicative accommodation* denominates a continuum that ranges from child-centered communication to situation-centered communication with children. One extreme of the continuum, the child-centered communication, is characterized by the caregivers' attempt to accommodate to the child. Here, the adult makes heavy use of child-directed speech, celebrates every advance the child shows and makes a great effort to try to understand what the child wanted to say. The other extreme of the continuum is the situation-centered communication with children. Here, the child is expected to accommodate to the situation and to learn how to act in a pragmatically appropriate way. Thus, the adult does not alter his/her speech for the sake of the child and chooses to simply ignore the child when his/her utterance was not appropriate in the given situation. The definition of this variable allows a comparison between the different linguistic registers used to communicate with children. Thus, on the one

hand, one can state that Samoan or Kaluli caregiver-child interaction e.g. is more situation-centered while German or English caregiver-child interaction is more child-centered (Schieffelin & Ochs, 1986). But, on the other hand, it is also possible to make observations about the different language uses within a language community, showing e.g. that within the English language community a mother-child interaction is usually more child-centered than a father-child or a sibling-child interaction (Mannle & Michael Tomasello, 1987).

2.2.1.1. The Quiché Mayan language community

The Quiché Mayan language community of Zunil, a small village in Guatemala, is one example of a language community with only little vocal interaction between infants and their parents (Pye, 1986). Parents hardly ever talk to their children for the sake of enhancing their linguistic development. Very young children are mostly ignored although they are present at all times and, therefore, experience interactions between the other members of the language community.

An in-depth inspection into the different linguistic features including phonology, lexicon, syntax and discourse showed that Quiché Mayan mothers do not make any important adaptations when talking to their infants; parents only start to converse with their children after they have acquired their first words by their own means (Pye, 1986). Quiché Mayan language data, therefore, contradict the hypothesis that child-directed speech functions as some sort of necessary language-teaching device and confirms the assumption that children are perfectly able to learn language and its usage through overhearing and observation.

2.2.1.2. The Kaluli language community

Another example of a language community that does not make use of child-directed speech is Kaluli from the Southern Highlands Province of Papua New Guinea. As Schieffelin (1986) comments the progress of language acquisition was primarily defined by the pragmatic function of the language. During the first months of life the

Kaluli describe the infants as helpless and "soft" creatures that do not have any understanding. It is only after the child acquires two critical words (*no* – mother, *bo* – breast) that mothers start to actively teach the child how to speak. Teaching, then, consists of giving the child a model of what to say, followed by the word *ɛlɛma*, an imperative form that means "say like that". When mothers start to teach language, unlike mothers in Western cultures, they do not teach words for objects. Instead, they teach the appropriate phrases or sentences for given situations. In this way, they tend to use a rather dominating way of teaching with which they aim at "fitting (or pushing) the child into the situation" (Schieffelin, 1986, p. 533). The language learning process is seen as a "hardening process" that disembogues in an adult-like pragmatically appropriate language use. This is necessary because in the Kaluli culture it is the speaker who is responsible for expressing himself clearly to his environment – a duty children are not relieved of. It is important to underline that Schieffelin points out that "Kaluli child language even in its early productive usage, appears to sound relatively mature compared with the utterances of children speaking English." (Schieffelin, 1986, p. 537). Therefore, it would be erroneous to assume that the lack of special child-tailored mechanisms like child-directed speech results in poorer language acquisition levels.

The fact that Kaluli language teaching is driven by pragmatics rather than by the acquisition of single words once again points to the importance the pragmatics of a language can have for an emerging communicative system.

2.2.1.3. The Athabaskan language communities

Scollon and Scollon (1981) describe the acquisition of Athabaskan languages in Alaska and Nothern Canada. One striking difference between the Athabaskans and the other cultures referred to in this section is that the speakers are all bilingual with the Athabaskan language not necessarily being the first language to address children in. Athabaskans do not expect their children to speak until considerably older, at an age of about five years. It is assumed that "it takes a lifetime to learn Athabaskan languages well" (R. Scollon & S. B. K. Scollon, 1981, p. 133). In the Athabaskan

communities the individual is held in very high esteem. Therefore, they are very careful not to intervene in other individuals' activities, thinking and movements. They are also very conscious of the social relations of dominance within their communities. The person in the subordinate position is expected to be the spectator and the person in the superordinate position is expected to display. As children are in a subordinate position in relation to adults they are expected to actively listen to them in order to benefit from their experience and to observe the world around them to learn from it. This is why children are not explicitly taught. The Athabaskans feel that it is dangerous to the spiritual, mental, and psychological well-being of a child to seek to stimulate him into performance in public contexts or even to observe his behavior in any way that might intervene in his activities (R. Scollon & S. B. K. Scollon, 1981, p. 8). A child in relation to an adult is expected to be quiet and reserved. Early linguistic productions of young children, thus, are often ignored. The reluctance of active teaching in the Athabaskan culture places their children close to the situation-centered extreme of Schieffelin and Ochs' (1986) communicative accommodation scale, which means that they acquire most of their language skills through indirect learning from listening in and observing their linguistic environment.

2.2.1.4. Trackton English

Heath (1983) studied language acquisition in Trackton, a small African American working-class community in the Piedmont area of the Carolinas where children are not explicitly taught how to speak but learn language due to their continuous inclusion as part of the family and the whole community. During the first six months of life adults neither directly address the infants nor use their given names, which they feel children will only need years later when they start school. This, however, does not mean that they ignore the infants; they still talk quite a lot *about* them. In Trackton, the audience demands reciprocity in communicative situations. Children are, therefore, expected to pay close attention to the situations around them in order to learn to behave appropriately. Since the children are never excluded from any kind of interaction, they have a wide range of learning opportunities. Given this attitude, it is not at all surprising that adults do not make any language adjustments as the ones that

characterize child-directed speech, although they recognize these adjustments as phenomena which exist outside their way of bringing up their children. Heath refers to the following comment of a Trackton grandmother about the language learning of her grandson Teegie:

> "He gotta learn to know 'bout dis world, can't nobody tell 'im. Now just how crazy is dat? White folk uh hear dey kids say sump'n, dey say it back to 'em, dey ask 'em 'gain 'n 'gain 'bout things, like they 'posed to be born knowin'. You think I kin tell Teegie all he gotta know to get along? He just gotta be keen, keep his eyes open, don't he be sorry. Gotta watch hisself by watchin' other folks. Ain't no use me tellin' 'im: 'Learn dis, learn dat. What's dis? What's dat?' He just gotta learn, gotta know; he see one thing one place one time, he know how it go, see sump'n like it again, maybe it be de same, maybe it won't. He hafta try it out. If he don't be in trouble; he get lef' out. Gotta keep yo' eyes open, gotta feel to know." (Heath, 1983, p. 84).

The overall attitude toward children is that they are "not expected to *be* information givers; they are expected to *become* information-knowers by 'being keen', and by taking in the numerous lessons going on in their noisy multi-channeled communicative environment" (Heath, 1983, p. 86).

2.2.1.5. The Samoan language community

Ochs (1986) investigated the acquisition of the Samoan language in a village on the island of Upolu in Western Samoa. The most outstanding characteristic of the Samoan language is the existence of two distinctive major registers called *tautala lelei* (good speech) and *tautala leaga* (bad speech). These two registers are used depending on the context in which the respective interaction takes place. Their use depends on the social distance or the familiarity that exists between speakers, the grade of formality of the situation or the gender of the speaker. Especially the parameter of social distance plays an important role in the language use in everyday life. The differences between

tautala lelei and *tautala leaga* affect linguistic features on different levels, ranging from phonology to the lexicon, morphosyntax and the organization of discourse. This peculiarity of the language poses an additional difficulty for children acquiring the language: they have to learn both registers although they are mainly addressed in *tautala leaga*. This means that they have to learn *tautala lelei* only from observing interactions going on between other people. But knowing both registers does not suffice: they need to generalize over all interactions they experience to figure out in which situation to use which of the registers.

As for social dominance, the general principle is that people of lower status adjust their speech to people of higher status, a principle that is taught to the children from very early on. In the child-adult relationship it is the child who is supposed to adapt to the adult. Thus, language learning is the children's and not the adults' responsibility, which explains why adults do not use child-directed speech. But nevertheless, at the age of 2 ½ years every child in Ochs' study had achieved some competence in *tautala lelei* and *tautala leaga* and they all were able to use both registers to a limited extent in socially appropriate contexts showing that, at least in the case of *tautala lelei,* they learned merely through listening in to conversations going on between other people of their language community.

2.2.1.6. The Japanese language community

In the context of these examples Japanese steps out of line. The language community is not less child-centered than the usually studied Western cultures, i.e. it is not a culture in which infants' and children's linguistic productions are ignored. On the contrary, Japanese displays a rather elaborate child-directed speech (Clancy, 1986; Masataka, 2003). Nevertheless, it is a language in which pragmatic and sociolinguistic factors determine grammar, i.e. if the child is to master syntax and morphology she needs to acquire the quite subtle pragmatic system in the first place (Clancy, 1986). The logic is that pragmatics partly determines aspects such as word order, ellipsis and sentence-final markers that change depending on the formality of the speech context, the relative status of speaker and hearer, the nature of their relationship, the gender of

the speaker, and sometimes even the gender of the listener. To acquire this rather complicated system, i.e. the knowledge about how to make one's grammatical choices based on pragmatic and sociolinguistic conditions, there is evidence that the children rely on indirect or overheard input not addressed to them. This argument is especially invoked in the case of polite and honorific speech and is reflected in the fact that Japanese mothers typically call their children's attention not only to the sounds in their environment but also to the speech of other people, thereby actively training their overhearing skills (Clancy, 1986). Japanese thus illustrates rather clearly that dyadic and multi-party interactions are not mutually exclusive but complementary.

2.2.2. Including multi-party learning in the study of language acquisition

Going back to children in the industrialized countries and relating their language environments to the ones subject of the sociolinguistic studies cited above, it is important to investigate which type of input the children can benefit from in their language learning processes. To what extent do they experience dyadic and multi-party interactions or, in other words, where exactly are they to be found on the communicative accommodation scale? Traditionally, they are supposed to be located at the child-centered extreme (Lieven, 1994). There are, however, indications that this might not be completely true: A study realized by van de Weijer (2002) e.g. focused on the question of what kind and amount of linguistic input an infant receives in a day. He recorded all speech one infant heard during a period of 91 days at the age of six to nine months. The infant was from a Dutch family consisting of the parents and a sister two years her elder. Additionally she had a babysitter and visited daycare center. Van de Weijer's results show that only about 15% of the speech this infant heard was addressed to her. The majority of language input was overheard speech between adults or children. This indicates that, although Dutch makes use of child-directed speech, it is clearly not situated at the child-centered extreme of the communicative accommodation scale emphasizing the importance of speech not directly addressed to the infant as a source for language acquisition. Thus, van de Weijer's results point to the same direction as Schieffelin and Ochs' (1986) observation revealing that children

in all societies experience both dyadic and multi-party interactions – but to a different degree.

Another argument for the relevance of multi-party interactions as an important source of input for speech acquisition comes from a study about the syntactic abilities of children with hearing loss. Friedman and Szterman (2006) analyzed production and comprehension of three different syntactic structures known to be specifically impaired in children with hearing loss: passives, wh-questions and object relative clauses. Their results indicate that individual performance correlated strongly with age at the onset of intervention: only children who received hearing aids before the age of 8 months performed well in the comprehension tasks. Note that type of hearing aid, length of use of cochlear implant, and the degree of hearing loss showed no correlations with syntactic performance. These results indicate that children need to be exposed to natural language during their first months of life in order to set a reliable basis for an intact and exhaustive development of syntax. Friedman and Szterman's results correspond to those of Yoshinaga-Itano and Apuzzo (1998a, 1998b) who tested the linguistic performance of children with hearing loss, comparing children whose hearing loss was identified before vs. after 6 months of age. The children were tested at an age of 26 and 40 months using questionnaires. At 26 months (1998a) the authors reported that the infants identified between birth and age 6 months scored significantly higher on measures of expressive and receptive language, personal-social development and expressive and receptive vocabulary. Furthermore, they outperformed their later-identified peers on measures of general development, situation comprehension and vowel production. The majority of the children identified by 6 months scored near or within the limits for normal development. At an age of 40 months (1998b) the earlier identified children displayed only a slight delay compared to children with normal hearing. Notwithstanding, they still scored within the age limits, showing significant advantages in expressive and receptive language compared to their later-identified peers who were almost twice as delayed. The severe consequences of a delayed recognition of hearing impairments dramatically show how important it is that children get actively involved in a speech community by making very early linguistic experiences a great part of which, as we have learned from van de

Weijer's work (2002) will necessarily be overheard speech. Thus, the lack of linguistic input from the surrounding speech community results not only in a severe delay at the different linguistic levels but also burdens the general personal and social development of the affected children.

Another reason for the argument that learning through observation or overhearing should be given more prominence in the study of language acquisition stems from the social changes going on in the industrialized cultures where we observe an increasing number of children visiting daycare. Therefore, it is paramount that the study of language acquisition adapts to these circumstances taking into account the growing exposition of infants to multi-party interaction and the corresponding shift toward a more situation-centered communication with children on the communicative accommodation scale. By way of example, I will cite German numbers presented by the Federal Statistical Office (2010). The number of children in daycare in Germany has risen considerably between the years 2006 and 2009: The percentage of children between age three and six who attend day care in Germany increased from 87.6% in 2006 to 92.5% in 2009. The number of under-three-year olds increased from 13.6% in 2006 to 20.4% in 2009. Still, the amount of day care places for children under three does not cover the demand – a fact reflected in the commitment of the German government to create more places for this age group with the goal to be able to offer daycare for a percentage of 35% of the under-three-year olds by the year 2013.

This changing reality will have consequences for the way small children acquire language. The traditional family model provided for many hours per day in which mother and child formed an integrated whole. This ended only when a child entered kindergarten which was normally the case at the age of around three years. Nowadays, however, more and more children under three are visiting daycare. Here the adult-child ratio is a one-to-many relation, i.e. one adult is responsible for a group of children. Therefore, children are exposed to an enriched language environment. Whereas children in the traditional families listened mostly to their mothers who were communicating face-to-face with them using child-directed language now they experience all sorts of interactions: dyadic communication with different adults or children but also different triadic or even multi-party communications in different

configurations including children as well as adults, who do not necessarily take into account the smaller child's language development stage. In this kind of situation the child will depend to a high degree on her ability to learn from speech not addressed to her.

2.2.3. Developmental studies on triadic learning

There has been only a limited number of studies on children's learning from speech not addressed to them, most of which focused on overhearing (Akhtar & Herold, 2009; Martínez-Sussmann, Akhtar, Diesendruck, & Markson, 2010), i.e. the children's capacity to actively listen in on third party conversations. These studies addressed (1) children's abilities to monitor other people's conversations by analyzing their eye-gaze and joint attention behavior (Barton & Michael Tomasello, 1991; Collicot, Collins, & Moore, 2009), their capacity to intrude in conversations going on between others (Dunn & Shatz, 1989) and their reactions when hearing comments about themselves (Forrester, 1988) as well as (2) their capacity of learning words through overhearing by comparing pronoun acquisition of first- and secondborn children (Oshima-Takane, 1988; Oshima-Takane et al., 1996) and children's learning of words from overheard conversations between two adults (Akhtar et al., 2001; Floor & Akhtar, 2006; Forrester, 1988; Martínez-Sussmann et al., 2010). In the following I will give an overview of these studies and their findings in order to link this work to related research.

The ability of following their caretakers' eye gaze has been assumed to be a prerequisite for infants to learn new words and actions on objects (Carpenter, Nagell, & M. Tomasello, 1998). So, if children are able to learn words in triads they must also be able to engage in third-party gaze following in order to identify the object labeled by the new word, a hypothesis addressed in an experiment realized by Collicot et al. (2009). They tested third-party gaze following in triads by having children aged 12 to 18 month observe face-to-face interactions between an experimenter and their mothers in which the experimenter periodically turned her head to gaze at one of two toys placed at different locations in the room. The mothers had been instructed to follow

the experimenter's gaze direction. Collicot et al.'s (2009) results show that the older children displayed significantly more gaze following than the younger children. Nevertheless, even the younger children showed some evidence of an emerging sensitivity to the adults' gaze direction by spending significantly more time gazing at the toy in the adults' attentional focus. This shows that the ability to follow a third person's gaze has already started to emerge at the time of children's verbal onset, thereby setting the basis for learning words from third-party interactions.

Barton and Tomasello (1991) studied the general nature of joint attention and conversation in mother-infant-sibling triads, taking into account not only eye gaze but also children's verbal and nonverbal behaviors. The infants belonged to two age groups: group one included children aged 19 to 20 months and group two consisted of children aged 23 to 25 months. Data were collected from recordings of free play. Barton and Tomasello's (1991) results show that even the younger children were able to participate in triadic joint attention resulting in fairly stable triadic conversations. In comparison to dyadic interactions, the triadic conversations tended to be nearly three times longer. Furthermore, the infants tended to react to comments or requests addressed to the sibling to the same degree as if they had been addressed to them by making relevant verbal contributions to comments or providing the requested objects. The children, however, did not try to answer questions not addressed to them indicating that they did not just react to any comment, request or question they heard but were able to tell who was being addressed. The authors concluded that there are important differences in the dynamics of dyadic and triadic interactions and that it is not possible to analyze triadic interaction on the basis of the principles governing dyadic interaction. The investigation of language acquisition, thus, needs to go beyond mother-child dyads and study all the different contexts – including triads – in which children learn language.

By studying intrusions Dunn and Shatz (1989) examined the question of whether two-year-old children attend to and understand the topic of speech not addressed to them using an exclusively verbal measure. In a longitudinal study in which they analyzed mother-infant-sibling interactions they found out that both the quantity and the quality of intrusions tend to increase in the course of the third year of life: Children tend to

take up more of the opportunities to intrude, encoding more as well as a higher amount of new information in their intrusions. The study by Dunn and Shatz (1989) clearly shows that children do not necessarily need to be directly addressed to understand language and follow conversations. Instead, they seem to be able to monitor and understand conversations between others. Moreover, they are able to use their own means of choosing and attending to communicative situations going on in their environment to enrich their linguistic experience and, thereby, find a way of successfully participating in multi-party conversations.

In the same line of investigations, Forrester (1988) studied children aged between 3;5 and 5;5 in two age groups to test their monitoring skills in polyadic conversations. The experimental setting he chose, nonetheless, was much more complex than the one in the aforementioned study as it included four children who were engaged in an interesting activity. The children were seated at two tables on the right and left side of an experimenter. They were asked to draw pictures while the experimenter addressed them – one at a time – with a comment on the picture of the child seated next to him/her. The comments had the following form: *'Jamie, that's a nice painting Katie's doing'* and thus included the name of one child being directly addressed and the name of another child whose picture was commented on. The reactions of the children were analyzed on the basis of their gaze behavior and their verbal and nonverbal responses. The results indicate that the conversation monitoring skills and the ability to participate actively in polyadic conversations are closely connected. Even the younger children seemed to be conscious about the difference between being directly addressed and overhearing a comment about themselves indicating that they are able to extract information from either situation as they are both perfectly familiar to them.

Oshima-Takane et al. (1996) build on the aforementioned studies but opt for a different methodology because they stress that these studies did not reliably prove that children *learn* language from overheard conversations. Instead, they only showed that children attend to and understand overheard conversations. To remedy this problem they used English first- and second-person pronouns as linguistic stimuli. They based their hypothesis on the assumption that the correct use of pronouns can only be learned from overheard speech as they do not have fixed reference, which means that children

need to abstract from different occurrences of the pronouns. So, their hypothesis was that secondborn children would benefit from being more exposed to overheard speech than firstborns resulting in an earlier acquisition of personal pronouns. Their subjects were 16 first- and 16 secondborn children with siblings 1-4 years their elder. The children's age ranged from 20 through 22 months. The authors gathered data from free play and two interactive tasks: A pointing task in which the experimenter pointed to different body parts asking e.g. *"whose nose is this?"*, and a picture task in which the child was presented with different photographs showing the child, the caregiver and the experimenter and asked *"who's this?"* The results show that although first- and secondborns did not differ significantly in any measure of general language development, secondborns produced significantly more personal pronouns. Secondborns in both the controlled and the spontaneous production conditions produced significantly more correct first-person pronouns. As for the second-person pronouns, the authors observed a tendency to the same direction but the differences did not reach significance. A follow-up study conducted 3 months later with 10 of the first- and 10 of the secondborn children revealed that significantly more secondborns than firstborns produced correct second-person pronouns maintaining their lead over the firstborn children. These studies show clearly that the higher amount of linguistic triadic experiences secondborn children gather enhances their respective linguistic development resulting in a significantly higher learning success.

Akhtar et al. (2001) conducted a more general interaction study in which they explore the question whether children are able to acquire vocabulary from speech not addressed to them. They taught 24 children aged 2;4 to 2;8 object labels and action verbs in two conditions: directly addressed and overhearing. In the addressed condition the child was seated in front of an experimenter who presented him/her the new objects or actions introducing the new words. In the overhearing condition, on the other hand, the same interaction went on between two experimenters while the child was positioned as an onlooker to the interaction. Learning success was tested using comprehension tests. The results of these experiments showed that the children learned the words equally well in both conditions. The experimental design used in the overhearing conditions of this experiment was very similar to the model/rival

technique Pepperberg (1997, 2002) used to teach grey parrots. The most important difference was that the Akhtar designs abstained from using role reversal. Otherwise, both the grey parrot in Pepperberg's (1997, 2002) design and the children in Akhtar et al.'s (Akhtar, 2005; Akhtar et al., 2001; Floor & Akhtar, 2006) design observed a routinized interactive sequence between two adults and were able to learn words for objects presented in these overhearing conditions.

A follow-up study involving younger children aged 1;11 to 2;2 revealed similar results for object label learning but not for action verb learning. In a later experiment, Akhtar (2005) tested the robustness of the learning process in the triadic condition. 48 children were tested in two age groups, the first ranging from 22 to 26 months and the second from 28 to 32 months. All children participated in both conditions: triadic learning with vs. without distracting activity. The methodology was equal to the one used in the overhearing condition in the aforementioned study. The children were taught only object labels but these were presented in directive vs. labeling statements with the intention of comparing a linguistic context in which the unknown word is stressed with one in which it is not. The distractive activity consisted in providing an interesting toy for the child to play with while he/she was overlooking the interaction going on between the two experimenters. Again, learning success was evaluated using comprehension tests. The results of this study correspond to those of the earlier one showing that by 25 months children are able to learn from overhearing even if they are distracted by playing with an interesting toy. This is true not only if the new word is presented stressed, at sentence-final position but also when it is presented unstressed in a directive utterance. In an attempt to probe the limits of children's ability to learn words through overhearing, Floor and Akhtar (2006) found out, that even children as young as 18 months were able to learn words through overhearing. In a further follow-up study to Akhtar et al. (2001) and in accordance to Schieffelin and Ochs' observation that children experience dyadic and multi-party communicative interactions to a different degree in all cultures (2001) Shneidman et al. (2009) showed that it is not only the culture a child grows up in that affects her learning success in overhearing conditions but also her immediate linguistic environment. They found out that children with more overhearing experience seem to develop attention strategies that

facilitate learning from overhearing (Shneidman et al., 2009). This corresponds to findings by Chavajay and Rogoff (1999) and Correa-Chávez et al. (2005) who found cultural patterns in the attentional behavior of children with different cultural backgrounds: Whereas children from cultures with traditionally more multi-party interaction tended to attend to two concurrent events simultaneously, children from cultures characterized by more dyadic interaction rapidly alternated their attention between the two concurrent events.

To sum up, the existing studies have taught us that even very young children can follow third party gaze enabling them to participate in joint attention and triadic conversations. They learn to attend and understand the topic of speech not addressed to them and are able to distinguish speech directly addressed to them from overheard comments about themselves. The amount of overheard speech seems to influence their language capacities as has been shown in the case of secondborn children whose enriched language environment enables them to acquire personal pronouns earlier than firstborns. Thus, there is evidence that children are able to learn words from overheard speech just as they are able to learn them from speech directly addressed to them. Which possibility they make more use of seems to depend on the attentional pattern characteristic of the culture the child grows up in.

2.2.4. Model/rival technique applied to children

To complete this section, I present a study that, to my knowledge, is the only one in which the model/rival technique used for parrots has been directly transferred to children: In a cooperative project, Pepperberg and Sherman (2000, 2002), a pediatric therapist specialized in treating children with autism, tested Pepperberg's model/rival paradigm with 24 children who suffered from various disabilities: 7 children with autism, 11 children with physical disabilities with developmental delays, and 6 children with attention deficit hyperactivity disorder (2000, 2002). The model/rival training was adapted for the children, which basically meant that the rewards were modified. Instead of being physical objects – the bird received the objects that had been named and was allowed to play with them – the children got the opportunity to

interact with the tutor and the model. This reward could consist of singing a song or playing a game. All children had received conventional one-to-one treatment before but without obtaining an important improvement in their condition. As the degree of the disabilities the children displayed varied greatly, it was not possible to directly compare their progress. Rather, each case had to be considered separately. With the model/rival training, however, all children made dramatic improvements in their interactive communicative skills. To give an impression of the advances achieved with the training I will give short examples of one child per group:

A four-year old autistic boy displayed only limited linguistic and social abilities and failed to establish eye contact. He was able to say “hi” but when asked “how are you” he replied with “four” (his age). He gave the same answer to all questions beginning with “how”. He was not able to answer questions, but could point to objects saying “want this”. He could not participate in every-day conversations due to his problems understanding question words. Prior speech intervention in small groups and individual sessions had been ineffective. He received model/rival training with the aim of teaching him appropriate interactive patterns including the establishment of eye contact. After six hours of intervention the boy had learned to establish spontaneous eye contact and to answer appropriately to different questions. When asked “how are you?” he now replied with “I am fine, how are you?”

A seven-year old girl, who suffered from physical disabilities with developmental delays, could not speak but used screaming, eye contact and guttural sounds for communication. She had minimal movement in upper and lower extremities and was not able to sit independently. She was very attracted to cause-and-effect toys. Prior speech therapy and sign language training had been ineffective. She received model/rival training with the aim of learning a viable form of communication. The girl learned very quickly; she acquired her first sign after only three trials and her first specific sound after six trials although she had difficulties producing the necessary lip movements. The use of these basic communicative skills led to a reduction of the screaming and additional therapy sessions enabled her to concatenate signs of her own leading to a noticeable improvement in her quality of life.

A nine-year old boy with attention deficit hyperactivity disorder and an above-average IQ, could not process peers' actions or body language. He was, thus, not able to play with peers and reacted impulsively. Prior behavior modification programs and one-to-one psychological counseling had been ineffective. He received model/rival training with the aim of helping him develop self-awareness of the consequences of his actions, establish adaptive and flexible behavior patterns and self-control, and learn to interpret peers' body language appropriately. The boy's behavior improved considerably leading to a much better social interaction with his peers. Nevertheless, he still tended to act impulsively, inappropriately and at times aggressively.

Pepperberg and Sherman's results (2000, 2002) show that in contrast to typically developing children who were able to learn from triads just as well as they did from dyads (Akhtar, 2005; Akhtar et al., 2001; Floor & Akhtar, 2006), children with disabilities could profit much more from triadic teaching. Just like in the case of Alex, the triadic teaching "did the trick" enabling the children to learn behaviors they had not been able to learn before in dyadic conditions. This proves the point that triadic teaching seems to have a potential to facilitate learning under certain conditions.

2.3. Hypotheses for the current study

The current study builds on the reported cross-cultural studies that maintain that triadic contexts represent typical conditions for language acquisition. As we have seen, this seems to hold true for children throughout all the different language communities: For children growing up in non-industrialized language communities (Heath, 1983; Lieven, 1994; Ochs, 1986; Pye, 1986; Schieffelin, 1986; Schieffelin & Ochs, 1986; R. Scollon & S. B. K. Scollon, 1981) as well as for children growing up in industrialized language communities (Akhtar, 2005; Akhtar et al., 2001; Clancy, 1986; Dunn & Shatz, 1989; Floor & Akhtar, 2006; Forrester, 1988; Martínez-Sussmann et al., 2010; Oshima-Takane, 1988; Oshima-Takane et al., 1996). Van de Weijer's (2002) case study on type and amount of linguistic input an infant receives reveals that even in industrialized communities overheard speech is much more ubiquitous than typically assumed in language acquisition. Studies with hearing

impaired children give reason to believe that we have only just started to recognize the vital importance learning from overheard speech has for the acquisition of a first language (Friedmann & Szterman, 2006; Yoshinaga-Itano & Apuzzo, 1998a, 1998b). Some studies suggest that triadic contexts, as opposed to dyadic contexts, could even facilitate learning because they create an enriched language environment (Oshima-Takane, 1988; Oshima-Takane et al., 1996) and present the learner with a model to imitate (Pepperberg, 2002; Pepperberg & Sherman, 2000, 2002). This last argument builds upon the idea that it is cognitively easier to simply imitate a model instead of being forced to abstract the correct (verbal) behavior from instructions given in a face-to-face scenario.

This is where I want to tie in running a study to further explore the role of overheard speech for language acquisition. Although Akhtar et al. have presented several studies on word learning through overhearing (Akhtar, 2005; Akhtar et al., 2001; Floor & Akhtar, 2006) they never used word production as a means to test learning success. If, however, the presence of a model to imitate does have an effect on word learning it would presumably show primarily in production and not so much in reception. The general logic is that a child would pick up a new word and learn it in the process of starting to actively use it – which does not necessarily mean that he has a full understanding of the word's meaning from the onset of the active use. Another important difference to Akhtar et al.'s (2001) study concerns the choice of the labels to be taught: whereas Akhtar et al. opted for non-words denominating artificially created objects, I decided to use real words denominating every-day objects. The reason was to represent a realistic word learning situation as far as that is possible within the setting of a lab experiment. The aim was not focus on observing a process in which the child is supposed to link a completely unknown item to a completely unknown word as in the classical fast mapping experiments, although this has the unquestionable advantage of being a very neat method. Instead, the goal of this work was to study gradually emerging links between objects and words that had probably already been experienced by children but had not yet been linked together as an object and its label as it has been claimed in slow mapping approaches (Capone & McGregor, 2005; Carey, 2010). Furthermore, I opted for a different reception test than

the one used by Akhtar et al. (2001). In principle, there are two possibilities to test children's learning of a newly introduced label on basis of reception: On the one hand, one can ask the child to indentify the very same object that had been used to introduce the new label, and on the other, one can ask the child to identify another exemplar of the object denominated by the label. The latter task is more difficult as it includes a transfer of knowledge but has the advantage that one can exclude the possibility that the child simply chooses whatever object has been most prominent during the teaching phase, which is the reason why I decided to make use of a transfer test to measure reception.

The present word learning study compares the learning success of two-year-olds in dyadic and triadic teaching conditions on the basis of their productions and receptions. Furthermore, it tests whether children can benefit from the presence of a model in a triadic context and if so whether this holds true for words from different word classes, which are supposed to reflect different degrees of difficulty. Here, the logic is that the more difficult the task gets the more difficult it could be for the child to apply his/her knowledge about communication to interpret the instructions given in the dyadic condition while the requirements for the imitation task remain the same: the child has to copy the behavior displayed by the model. Thus, the assumption is that the more difficult a task gets the more the children will take recourse to simple imitation. In other words: There seem to be two learning mechanisms at work: one transfer mechanism that allows children to use their prior knowledge in order to handle the interaction and one simple imitation mechanism that allows children to keep the interaction going even if they are not sure about how to behave appropriately. In this way they gain time and start to gather their own experiences by probing the word – a variation of learning by doing.

Following the argument from Shneidman et al. (2009), who maintain that children's learning success in overhearing conditions depends from their personal experience with this type of interactions, children who are more familiar with triadic or multi-party interaction are supposed to take more advantage from the triadic teaching scenario as they are presumably more used to monitoring and picking up words from other peoples conversations.

The influence shyness has on children's test performance has been discussed controversially in the literature: Although there have been results showing that shy children tend to score less than their less shy peers on language production tests – especially if these are conducted in a face-to-face manner (Spere, Evans, Hendry, & Mansell, 2009) –, results on reception tests have been mixed resulting in two competing explanations (Crozier & Hostettler, 2003): First, the vocabulary-competence hypothesis that explains the observed results with underlying differences in the children's competence and second the anxiety-performance hypothesis that assumes that both groups learn equally well on the level of competence and attributes shy children's lower scores in test situations to their experiencing a feeling of discomfort during these situations. These two explanations predict contradictory results for the present experiment: Whereas the vocabulary-competence hypothesis would anticipate lower scores of shy children in both, the production and the reception tests, the anxiety-performance hypothesis expects lower scores of shy children only in the production test. For the purpose of this work, I will assume the anxiety-performance hypothesis, therefore assuming that more talkative children will score higher than shyer children in the production but not in the reception task, as they would probably feel less inhibited by the fact that they are supposed to speak.

And finally, children with a more extensive lexicon are supposed to display a better learning success because they are more advanced in their language acquisition process, having gained more experience in learning new words, and would, thus, be presumably more ready to pick up new words.

In order to collect the data for these additional variables, I made use of two questionnaires: The first was the short version of the ELFRA-2 (Grimm & Doil, 2006) which is the test used in Germany in the context of the medical examination program to identify children at risk of having a speech development disorder and the second questionnaire was designed especially for the present study and included questions on the number of people living in the same household with the child and the number of siblings as well as the mother's educational state. Furthermore, it included the question whether the children attended kindergarten or spent part of their daytime with a nanny and, if so, how many children the nanny had in her care as well as a six-point-scale to

measure the children's level of shyness where 1 stood for "not shy at all" and 6 for "very shy". Finally, it included a list of all the words of vital importance for the study asking whether the children already understood or actively used them. For an example of the questionnaire see the appendix.

To sum up, the hypotheses tested with the first experiment were the following:

1) Children in the triadic condition were expected to learn words better because the triadic situation presented them with a model they could imitate, facilitating the task. This effect was supposed to augment with task difficulty.

2) Different word classes represent different degrees of difficulty for the word learning task.

3) Birth order and daycare visit as operationalizations of the children's experience with triadic interactions were supposed to enhance the advantage of the triadic over the dyadic condition.

4) Shyness was expected to have an effect on word production but not on word reception as the reception task did not require the child to speak.

5) Lexical development was expected to correlate with children's learning success as children with a more extensive lexicon are supposed to be better prepared to acquire new words.

2.4. Method

This chapter deals with the method applied to operationalize dyadic vs. triadic learning. It offers an adaptation of Pepperberg's model/rival training for child studies. Further, it elaborates on the decision to teach real unfamiliar words as opposed to artificial non-words. The design includes production and reception tests to measure learning success. Here, I decided for a transfer task as opposed to having the child identify the same object the label was introduced with. This makes the reception task more difficult than the test conducted in the studies realized e.g. by Akhtar et al. but

has the advantage of being a more reliable measure because it eliminates the possibility that the child simply chooses the object that had been in the focus of attention during the teaching phase. The chapter moves on to an account of the experimental design and setting and gives a detailed overview of the adopted procedure. The chapter concludes with a presentation of the test procedure employed to measure learning success.

2.4.1. Model/rival scenario for word learning

As already mentioned above, the design of the current experiment was inspired by Pepperberg's Alex studies (2002) and the studies by Akhtar et al. on learning words through overhearing (2001). In Pepperberg's design, the parrot was located as onlooker to a dialog going on between two experimenters. One of the experimenters acted as tutor and the other one as learner and as the parrot's rival for the tutor's attention. The dialog between the two experimenters had the form of a question-answer-routine. The tutor asked for the denomination of an object and the learner-rival gave either a correct or an incorrect answer. This in turn triggered either a positive, reinforcing feedback or a negative, corrective feedback. The positive feedback consisted of a verbal praise and the possibility for the learner to play with the object. The negative feedback consisted of a verbal scolding, a demonstrative interruption of eye-contact and a retraction of the object. Tutor and learner/rival constantly changed roles so that Alex learned to abstract the role from the person. Pepperberg's experience showed that Alex learned much better while observing the question-answer routines than when taught directly. He failed to succeed in the absence of feedback or role reversal. Learning success was tested by checking production as well as comprehension: On the one hand Alex was supposed to be able to take up the leaner's role in a comparable dialog and on the other he was expected to pick the object from a random set of different objects. In the design applied by Akhtar et al. the child was positioned as an onlooker to an interaction between an experimenter and an assistant. They used a special hiding apparatus consisting of four buckets mounted in a row on a wooden plank. In the buckets they hid four different objects and announced one of them with

the name of *toma*. Learning success was measured using a comprehension task: the children were asked to identify the *toma* from a random set of objects. Akhtar et al. made no use of role reversal.

In the present study I modified Pepperberg's model/rival training (Pepperberg, 2002) with a predesigned question-answer-routine containing reinforcing and corrective feedback. In both experimental conditions, the children were presented with an unfamiliar object and heard the new word five times before being asked to denominate the object. Learning success was measured using production and reception tests, where reception was defined by means of transfer: unlike in the Akhtar et al. study, it was not sufficient to identify the same object out of a random set of objects. Instead children were required to use the newly learned knowledge to identify another object of the same type. As the study by Akhtar et al. had shown that children - unlike Pepperberg's parrot - did not depend on role reversal to learn new words, I desisted from operationalizing role reversal.

As shown in Figure 1 below, the child in the dyadic condition is seated at a table facing experimenter 1 who acts as a tutor. In the triadic condition, on the other hand, the child is seated at a table facing experimenter 1, who acts as a tutor, and next to experimenter 2, who acts as a model for the child's behavior and a rival for the attention of experimenter 1. In the triadic scenario experimenter 1 tries to disregard the child as much as possible. In both conditions, experimenter 1 focused on his conversational partner – the child in the dyadic condition and experimenter 2 in the triadic condition – and started the question-answer-routine by pointing to the object in question and asking for its name. The correct name was given (either by experimenter 1 or 2 – depending on the condition) which, in turn, triggered a positive, reinforcing feedback including the possibility for the learner to explore the object. Then, the routine was repeated, but this time the given answer was incorrect, which triggered a negative, corrective feedback. Experimenter 1 then proceeded to test the child's learning success. For a more detailed description of the interaction and the tests see the section on the procedure below.

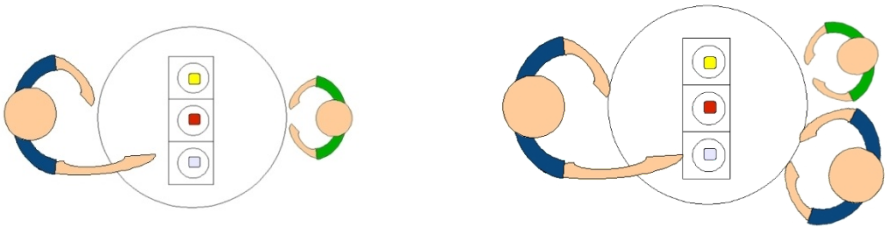

Figure 1: The two experimental conditions - dyadic vs. triadic teaching

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2.4.2. Participants

38 children aged 25 through 28 months (*M*=25.7, *SD*=1.1) participated in the experiment. All children were native German speakers and lived in Bielefeld and surroundings. We recruited the participants using different strategies: we released a press note advertising the research and the study, addressed families that had already participated in earlier studies, contacted different kindergartens and spoke to mothers on playgrounds or at public children's treats.

Of the 38 children (20 girls, 18 boys) who participated in the study 8 (5 girls, 3 boys) had to be excluded due to fussiness (2 girls, 2 boy) or non-compliance (3 girls, 1 boy). The sample, therefore, consisted of 30 children, 15 girls and 15 boys.

2.4.3. Stimuli

The decision to teach real words as opposed to non-words denominating everyday objects instead of artificially created objects had consequences for the choice of the stimuli for the current study. By the age of 25 months children are usually quite familiar with situations in which they are taught labels for objects. Thus, on the one hand, the objects to be taught had to be common enough for the child to have seen them but, on the other, also uncommon enough so that the children did not already know their labels. Furthermore, the design called for a possibility to manipulate the

task difficulty, which was obtained by teaching words from different word classes. One consideration was that most parents of children aged 25 months have already started to teach them the first color terms although they normally concentrate on the basic colors like red, blue, yellow, and - in the case of many girls - pink or rose but they have not yet started to introduce less common colors. Still, the children have begun to develop a color concept. Parents have also started teaching them the very first number terms like one or two. Sometimes they already started to introduce the counting routine of pointing to different objects while uttering number words and, although some of the participant children did know the routine, they had not yet mastered the correct sequence of number words much less their meaning. Yet, they still perceived and knew that there is a difference between several set sizes – an ability that is already present in a crude form in 6-month-old infants (Xu & Spelke, 2000).

Against this background, the children in the current experiment were taught labels for different pieces of jewelry, color adjectives denominating less common colors and number words denominating different set sizes.

For the jewelry, they were taught the German words *Ohrring* (earring), *Brosche* (brooch) and *Gürtelschnalle* (belt buckle), see Figure 2 below. One set of these items was used to teach the words to the children, and another one was used to test whether the children were able to transfer their newly acquired knowledge to another exemplar of the same object class. The objects differed in shape, color and size.

Figure 2: Stimuli for the presentation and transfer of nouns

For the color adjectives, the children were taught less basic colors like *lila* (lilac), *grau* (gray) and *orange* (orange). During the teaching phase, the colors were presented in the form of building blocks. For the transfer task, we used crayons of the same colors (see Figure 3).

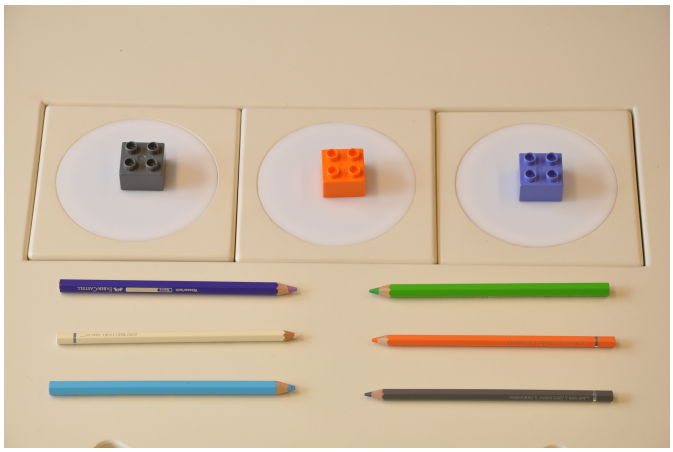


Figure 3: Stimuli for the presentation and transfer of color adjectives

For the number words, the children were taught labels for *vier* (four), *zwölf* (twelve), and *hundert* (a hundred) to denominate sets of different sizes. In the teaching phase, the different sets were presented using nets containing different quantities of identical wooden buttons. For the transfer task the child was presented with nets containing different quantities of marbles (see Figure 4).

Figure 4: Stimuli for the presentation and transfer of number words

The words, the ordering in which they were taught as well as the position on the table on which they were presented were randomized to avoid that children would be presented with a stepwise increase of task-difficulty or would learn positions on the table rather than the object-label match. Recall that the mother was asked to fill in a questionnaire during the warm-up phase in which she was asked to judge whether the child did already know certain words. Some of these words were the ones we were interested in. Only in case that the mother reported that her child already knew the word that had randomly been assigned to him or her, was the word changed ad hoc.

2.4.4. Conditions

The experimental sessions took place in the Emergentist Semantics Lab in an adjoining building of the university. The room was equipped with two child-sized tables, two or three child-sized chairs – depending on the experimental condition –, a comfortable armchair for the accompanying parent and two cameras to record the experiment from two different perspectives (see Figure 5).

One of the tables was placed next to the armchair and served for the warm-up phase. This gave the experimenter(s) the opportunity to instruct the mother to fill in some questionnaires while inviting the child to play with a simple jigsaw puzzle.

The table for the experiment was placed a little apart from but in full view of the mother. The intention of creating a distance from the mother was to make clear that the mother did not form part of the interaction that took part at this second table. The small chairs were placed at the table and were intended for the child and one or two experimenters – depending on the condition. The cameras were placed to the right and left of the armchair in the corners of the room where they were less noticeable.

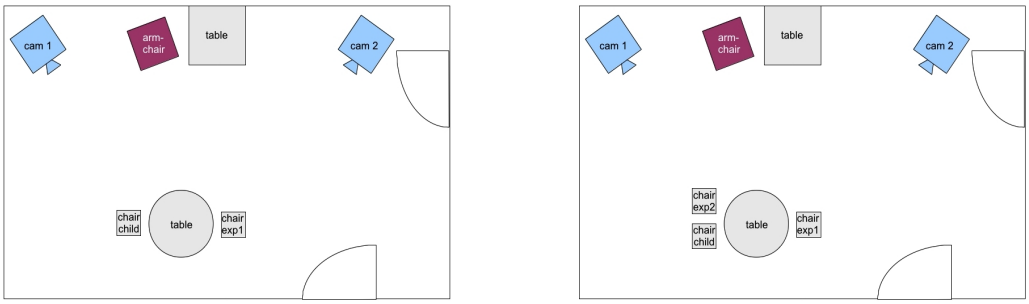


Figure 5: Dyadic vs. triadic setting

2.4.5. Procedure

2.4.5.1. Warm-up

The children and their parents were invited to come to our lab. When they arrived, the experimenter(s) first conducted a warm-up phase in which they played with the children to make them feel comfortable before starting the test. While the experimenter(s) engaged with the child in a simple jigsaw puzzle (*Tasty, tasty* by Haba®) the mother had been asked to fill in two questionnaires to collect data on the lexical development of the child - taking the opportunity to make sure that the child did not already know the words that were to be taught.

The child had been randomly assigned to one of the two experimental conditions and the words to be taught had been randomly chosen. Experimenter 1 checked the

questionnaire to make sure that the new words to be taught were really unknown to the child and changed to one of the alternative words when necessary.

After the child had started to communicate with the experimenter(s) experimenter 1 conducted a training aimed at preparing the child for the later reception/transfer test and checking whether the child understood the task. In this training the experimenter presented the child with a tray containing three objects: a train, a Playmobil® girl and a Playmobil® horse. The experimenter shook the tray while uttering the words *mischen, mischen, mischen* (mix, mix, mix). Then the experimenter directed the following request to the *child <name of the child>, gibst du mir mal <object label>?* (<name of the child>, would you give me the <object label>?), asking the child to hand over the objects, one at a time. The experiment began as soon as the child had chosen each item correctly. For the warm-up items see Figure 6.

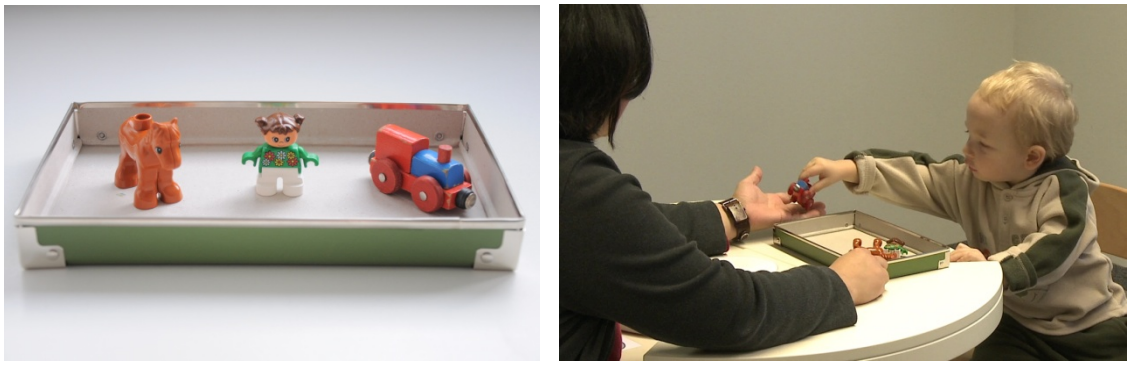
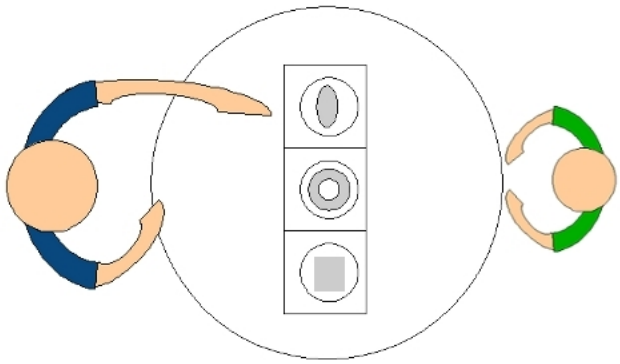


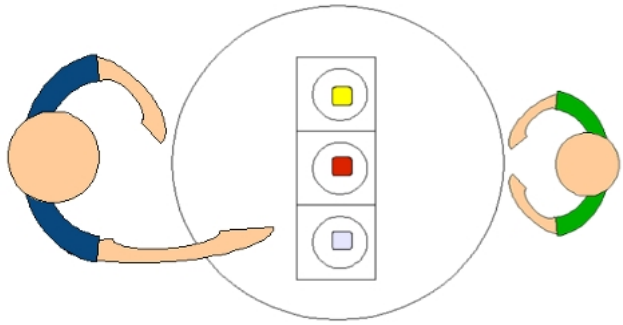
Figure 6: The warm-up items and procedure

2.4.5.2. Teaching phase

Experimenter 1 invited the child – and in the triadic situations experimenter 2 also – to sit down at a table. To make the experimental conditions as comparable as possible we developed a script including utterances, gaze direction and gestural behavior of the experimenter(s).

2.4.5.2.1. Dyadic teaching

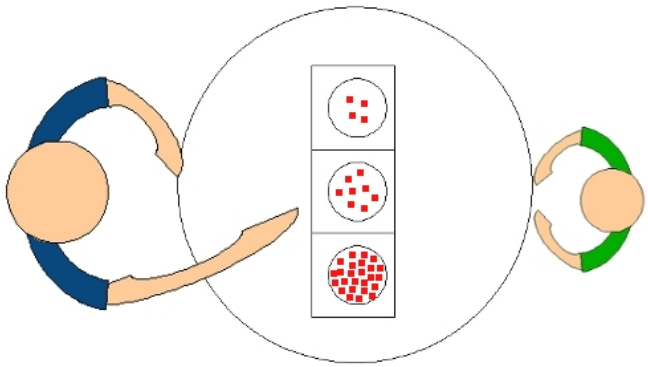
<table>
<tr><td colspan="2">Object label. The child was seated at the table in front of experimenter 1. The table was completely empty. Experimenter 1 took three objects out of a closed box that was located next to her and placed them on the three platforms located halfway between the child and herself.</td></tr>
<tr><td colspan="2">  </td></tr>
<tr><td>1. Experimenter 1 focuses on the child and catches her attention by calling her by her given name
2. Experimenter 1 points to one of the objects (gaze to object)
3. Experimenter 1: “Was ist das? “(gaze to child)
4. Experimenter 1: “Brosche?“
5. Experimenter 1: “Ja, richtig. Brosche. Das ist eine Brosche.“ (gaze to child)
6. Experimenter 1 picks up the brooch and explores it (3 sec)
7. Experimenter 1: “Legen wir das mal wieder auf den Tisch.“ (puts the object back on the table)</td><td>3. “What’s that?”
4. “Brooch?”
5. “Yes correct, brooch. That’s a brooch.”
7. “Let’s put that back on the table.”</td></tr>
<tr><td>1. Experimenter 1 focuses on the child and catches her attention by calling her by her given name
2. Experimenter 1 points to the object (gaze to object)
3. Experimenter 1: “Was ist das? “(gaze to child)
4. Experimenter 1: “Ohrring?“
5. Experimenter 1: “Nein!“ (shakes her head) „Brosche. Das ist eine Brosche.“ (gaze to child)
6. No exploration of the object (pause)
7. Experimenter 1 removes all items from the table</td><td>3. “What’s that?”
4. “Earring?”
5. “No! Brooch. That’s a brooch.”</td></tr>
</table>

<table>
<tr><td colspan="2">Color adjective. The child was seated at the table in front of experimenter 1. The table was completely empty. Experimenter 1 took three building blocks of different colors out of a closed box that was located next to her and placed them on the three platforms located halfway between the child and herself.</td></tr>
<tr><td colspan="2">  </td></tr>
<tr><td>1. Experimenter 1 focuses on the child and catches her attention by calling her by her given name
2. Experimenter 1 points to one of the building blocks (gaze to object)
3. Experimenter 1: “Welche Farbe hat der Klotz?“ (gaze to child)
4. Experimenter 1: “Grau?“
5. Experimenter 1: “Ja, richtig. Grau. Das ist ein grauer Klotz.“ (gaze to child)
6. Experimenter 1 picks up the building block and explores it (3 sec)
7. Experimenter 1: “Legen wir das mal wieder auf den Tisch.“ (puts the block back on the table)</td><td>

3. “What’s the color of that block?”
4. “Gray?”
5. “Yes correct, gray. That’s a gray block.”

7. “Let’s put that back on the table.”</td></tr>
<tr><td>1. Experimenter 1 focuses on the child and catches her attention by calling her by her given name
2. Experimenter 1 points to the building block (gaze to object)
3. Experimenter 1: “Welche Farbe hat der Klotz? “(gaze to child)
4. Experimenter 1: “Lila?“
5. Experimenter 1: “Nein!“ (shakes her head) „Grau. Das ist ein grauer Klotz.“ (gaze to child)
6. No exploration of the building block (pause)
7. Experimenter 1 removes all items from the table</td><td>

3. “What’s the color of that block?”
4. “Lilac?”
5. “No! Gray. That’s a gray block.”</td></tr>
</table>

<table>
<tr><td colspan="2">Number word. The child was seated at the table in front of experimenter 1. The table was completely empty. Experimenter 1 took three nets containing different sets of buttons out of a closed box that was located next to her and placed them on the three platforms located halfway between the child and herself.</td></tr>
<tr><td colspan="2">  </td></tr>
<tr><td>1. Experimenter 1 focuses on the child and catches her attention by calling her by her given name
2. Experimenter 1 points to one of the nets (gaze to object)
3. Experimenter 1: “Wieviele Knöpfe sind das? “(gaze to child)
4. Experimenter 1: “Zwölf?“
5. Experimenter 1: “Ja, richtig. Zwölf. Das sind zwölf Knöpfe.“ (gaze to child)
6. Experimenter 1 picks up the net of buttons and explores it (3 sec)
7. Experimenter 1: “Legen wir das mal wieder auf den Tisch.“ (puts the buttons back on the table)</td><td>

3. “How many buttons are these?”

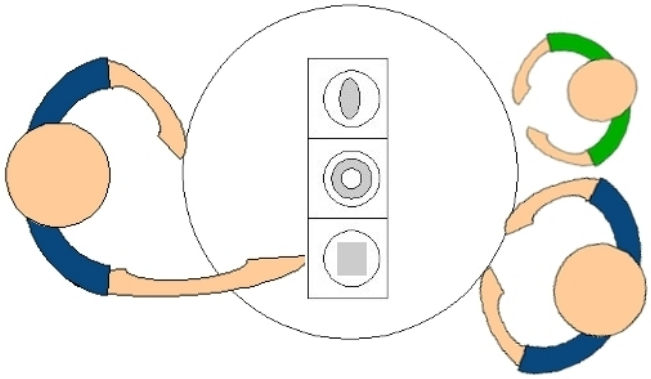
4. “Twelve?”
5. “Yes, correct, twelve. These are twelve buttons.”

7. “Let’s put that back on the table.”</td></tr>
<tr><td>1. Experimenter 1 focuses on the child and catches her attention by calling her by her given name
2. Experimenter 1 points to the nets (gaze to object)
3. Experimenter 1: “Wieviele Knöpfe sind das? “(gaze to child)
4. Experimenter 1: “Hundert?“
5. Experimenter 1: „Nein!“ (shakes her head) „Zwölf. Das sind zwölf Knöpfe.“ (gaze to child)
6. No exploration of the net (pause)
7. Experimenter 1 removes all items from the table</td><td>

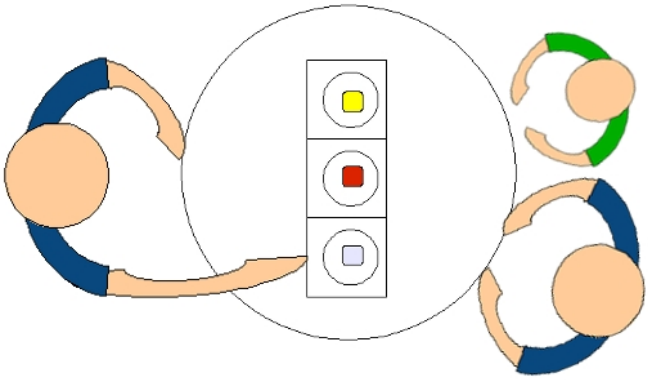
3. “How many buttons are these?”

4. “A hundred?”
5. “No! Twelve. These are twelve buttons”</td></tr>
</table>

2.4.5.2.2. Triadic teaching

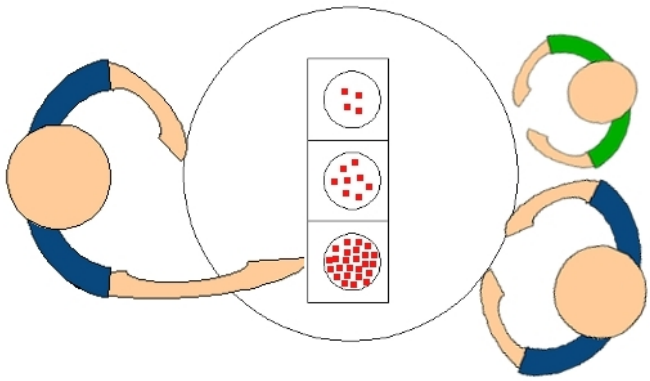
<table>
<tr><td colspan="2">Object label. The child was seated at the table in front of experimenter 1 and next to experimenter 2. The table was completely empty. Experimenter 1 took three objects out of a closed box that was located next to her and placed them on the three platforms located halfway between the child and herself.</td></tr>
<tr><td colspan="2">  </td></tr>
<tr><td>1. Experimenter 1 focuses on experimenter2 and catches her attention by calling her by her given name
2. Experimenter 1 points to one of the objects (gaze to object)
3. Experimenter 1: “Was ist das? “(gaze to experimenter 2)
4. Experimenter 2: “Brosche?“
5. Experimenter 1: “Ja, richtig. Brosche. Das ist eine Brosche.“ (gaze to experimenter 2)
6. Experimenter 1 hands the brooch to experimenter 2 who explores it (3 sec)
7. Experimenter 1: “Legen wir das mal wieder auf den Tisch.“ (holds out her hand for the object, receives it and puts it back on the table)</td><td>3. “What’s that?”
4. “Brooch?”
5. “Yes correct, brooch. That’s a brooch.”
7. “Let’s put that back on the table.”</td></tr>
<tr><td>1. Experimenter 1 focuses on experimenter 2 and catches her attention by calling her by her given name
2. Experimenter 1 points to the object (gaze to object)
3. Experimenter 1: “Was ist das? “(gaze to experimenter 2)
4. Experimenter 2: “Ohrring?“
5. Experimenter 1: „Nein!“ (shakes her head) „Brosche. Das ist eine Brosche.“ (gaze to child)
6. No exploration of the object (pause)
7. Experimenter 1 removes all items from the table</td><td>3. “What’s that?”
4. “Earring?”
5. “No! Brooch. That’s a brooch.”</td></tr>
</table>

Color adjective. The child was seated at the table in front of experimenter 1 and next to experimenter 2. The table was completely empty. Experimenter 1 took three color blocks of different colors out of a closed box that was located next to her and placed them on the three platforms located halfway between the child and herself.



1. Experimenter 1 focuses on experimenter2 and catches her attention by calling her by her given name 2. Experimenter 1 points to one of the building blocks (gaze to block) 3. Experimenter 1: *"Welche Farbe hat der Klotz?* "(gaze to experimenter 2) 4. Experimenter 2: *"Grau?"* 5. Experimenter 1: *"Ja, richtig, grau. Das ist ein grauer Klotz."* (gaze to experimenter 2) 6. Experimenter 1 hands the block to experimenter 2 who explores it (3 sec) 7. Experimenter 1: *"Legen wir das mal wieder auf den Tisch."* (holds out her hand for the block, receives it and places it back on the table.)	3. *"What's the color of that block?"* 4. *"Gray?"* 5. *"Yes correct, gray. That's a gray block."* 7. *"Let's put that back on the table."*
1. Experimenter 1 focuses on experimenter 2 and catches her attention by calling her by her given name 2. Experimenter 1 points to the building block (gaze to block) 3. Experimenter 1: *"Welche Farbe hat der Klotz?* "(gaze to experimenter 2) 4. Experimenter 2: *"Lila?"* 5. Experimenter 1: *„Nein!"* (shakes her head) *„Grau. Das ist ein grauer Klotz."* (gaze to experimenter 2) 6. No exploration of the object (pause) 7. Experimenter 1 removes all items from the table	3. *"What's the color of that block?"* 4. *"Lilac?"* 5. *"No! Gray. That's a gray block."*

Number word. The child was seated at the table in front of experimenter 1 and next to experimenter 2. The table was completely empty. Experimenter 1 took three nets containing different sets of buttons out of a closed box that was located next to her and placed them on the three platforms located halfway between the child and herself.



1. Experimenter 1 focuses on experimenter2 and catches her attention by calling her by her given name 2. Experimenter 1 points to one of the sets of buttons (gaze to buttons) 3. Experimenter 1: *"Wieviele Knöpfe sind das?* "(gaze to experimenter 2) 4. Experimenter 2: *"Hundert?"* 5. Experimenter 1: *"Ja, richtig, hundert. Das sind hundert Knöpfe."* (gaze to experimenter 2) 6. Experimenter 1 hands the net to experimenter 2 who explores it (3 sec) 7. Experimenter 1: *"Legen wir das mal wieder auf den Tisch."* (holds out her hand for the buttons, receives them and puts them back on the table)	3. *"How many buttons are these?"* 4. *"A hundred?"* 5. *"Yes correct, a hundred. These are a hundred buttons."* 7. *"Let's put that back on the table."*
1. Experimenter 1 focuses on experimenter 2 and calls her by her given name 2. Experimenter 1 points to the set of buttons (gaze to buttons) 3. Experimenter 1: *"Wieviele Knöpfe sind das?* "(gaze to experimenter 2) 4. Experimenter 2: *"Zwölf?"* 5. Experimenter 1: *„Nein!"* (shakes her head) *„Hundert. Das sind hundert Knöpfe."* (gaze to experimenter 2) 6. No exploration of the buttons (pause) 7. Experimenter 1 removes all items from the table	3. *"How many buttons are these?"* 4. *"Twelve?"* 5. *"No! A hundred. These are a hundred buttons."*

2.4.5.3. Production test

After each teaching phase, experimenter 1 turned to the child and caught his/her attention by calling him/her by his/her given name before addressing him/her with the same question he/she had heard in the teaching phase. The child was supposed to utter the word that had been taught before. In the later evaluation, the child got two points for correct and task-appropriate production when he behaved as expected. In cases in which the child produced the correct word but not in answer to the question he got only one point for correct production, and in cases in which the child either did not answer at all or produced an incorrect answer he got no points.

2.4.5.4. Reception/transfer test

In the reception test, experimenter 1 cleared the table of all objects before placing an alternative set of objects in front of the child. In the case of the objects this alternative set consisted of alternative exemplars of the three presented objects, namely another earring, brooch and belt buckle. (See Figure 2)

In the case of the colors that had been taught by means of building blocks of different colors the alternative set consisted of crayons of the corresponding colors. (See Figure 3)

In the case of the number words that had been taught using sets of wooden buttons the alternative objects were sets of marbles. (See Figure 4)

Experimenter 1 then produced a tray and asked the child to help her to place the objects on the tray. She conducted the procedure that had previously been practiced during the warm-up phase, namely mixing the objects while saying *"mischen, mischen, mischen"* ("mix, mix, mix") and asking the child to hand over the object whose name the child had just been taught or the object that displayed the color or the set size the child had just been taught uttering *"<name of the child> gibst du mir mal*

die Brosche?" ("<name of the child>, would you give me the brooch?") while holding out the tray with the right hand and holding out her left hand palm up next to the tray.

In the later evaluation, the child got two points for a correct and task-appropriate answer when she gave the experimenter the requested object or when she identified it by pointing to it.

If the child handed over all objects beginning with the one the experimenter had requested she got one point for a correct answer. This turned out to be necessary because many children seemed to have been primed by the warm-up task to hand over all items, one at a time.

If the child chose not to answer at all or handed over an incorrect item or all items at once she got no points at all.

2.4.5.5. End of session

At the end of the session, the child received a book and a rubber duck. The experimenters gave the parents an explanation about the aims of the experiment and the parents got the opportunity to ask any question they still had about the procedure before the families left our lab.

2.4.6. Pilot study

Prior to the experiment, I conducted a pilot study with five 27 through 29 months old children to test the stimuli, the experimental set-up, and the training and testing procedures. The pilot study showed some minor problems with the originally planned procedure. Therefore, I confined the age of the children to 25 through 28 months, made some changes concerning the stimuli and came to the basic decision to test reception by means of transfer.

2.4.7. Dependant variables

The dependant variables collected for data analysis were the following:

1. Word production: the child is asked to produce the learned label using the same question-answer routine that had been used to introduce the new label. Children could score between 0 and 2 points. They received two points for correct and task-appropriate answers, i.e. when they produced the correct word as an answer to the question addressed to them. Children scored one point for correct answers, i.e. when they uttered the correct word but not as an answer to the question. And finally, they got no points for incorrect or no answers.

2. Word reception: The child is asked to hand over another exemplar of the newly introduced object as well as another object of the newly introduced color or quantity. Children could achieve 0 to 2 additional points: again, they got two points for correct and task appropriate answers, i.e. when they handed over or pointed to the correct item as an answer to the question. They scored one point for a correct answer when they handed over all items beginning with the correct one. This turned out to be necessary because many children seemed primed by the warm-up task to hand over all items, one at a time. Finally they got no points when they did not hand over any item or handed over an incorrect item or all items at once.

3. Daycare visit and birth order as operationalization of the children's experience with triadic or multi-party interactions, collected using the questionnaire filled in by the parents.

4. Level of shyness: included in the questionnaire where the parents were asked to judge their child's level of shyness on a scale from 1 (not shy at all) to 6 (very shy). Additionally, experimenter 1 made the same judgment on base of her experience with the child during the experimental session.

5. Lexical development: measured with the short version of the ELFRA-2 (Grimm & Doil, 2006) which is the official test used in Germany to identify children at risk of having a speech development disorder.

2.5. Results

Given that the collected data were not normally distributed (Kolmogorov-Smirnov $df = 15$, $p < 0.05$), I used Mann-Whitney tests for the analysis of overall production and reception. Additionally, several correlations were computed between the children's performance and factors like lexical development, shyness, and experience with triadic situations operationalized by birth order and daycare experience.

All statistical analyses were conducted using SPSS 19 (*Statistical package for social sciences (SPSS)*, 2011).

2.5.1. Children's overall performance

In the production tests, children in the dyadic condition gave correct answers in 30% of the cases whereas children in the triadic condition scored slightly less with 25.6% of correct answers. The same pattern – although with higher scores – can be observed in he reception tests, where children in the dyadic condition answered correctly in 50% of the cases and children in the triadic condition scored 43.3% (see Figure 7). Mann-Whitney tests comparing overall production in dyads and triads showed no significant advantage of the triadic over the dyadic condition (U=99, p=0.27 one-sided). The same was true for the overall reception test (U=87, p=0.13 one-sided). Note that the children achieved better results in the reception test as compared with their scores in the production test. However, this result is not at all surprising given that children in general are known to score better in language reception than in language production tests.

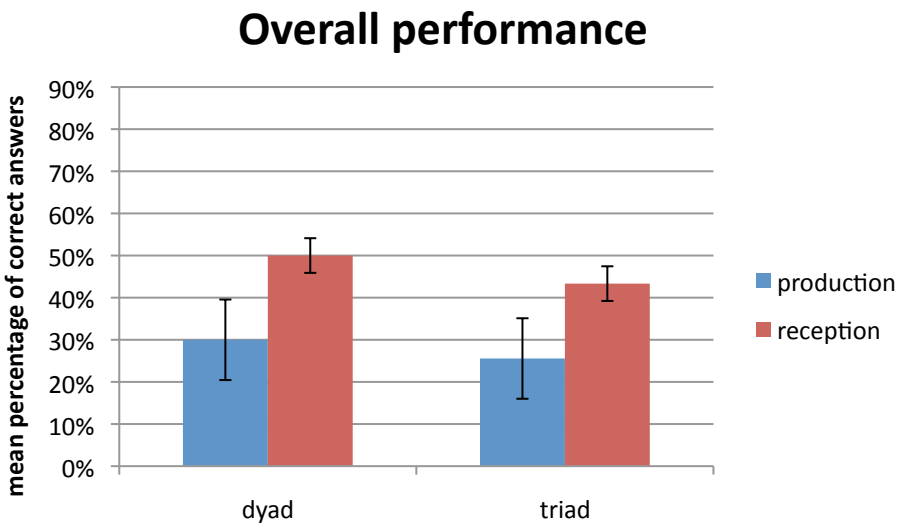


Figure 7: Overall performance in the dyadic and triadic conditions

Correlations between the children's gender and their overall performance using Spearman coefficient suggest that there were no significant differences in learning success between boys and girls (overall production r = -0.10, n = 30, p = 0.61, overall reception r = -0.09, n = 30, p = 0.63). Correlations of overall performance and shyness using Spearman coefficient revealed that shyness tends to influence only production (r = -0.36, n = 30, p = 0.06) but not reception (r = -0.06, n = 30, p = 0.37). This means that shyer children were less productive than their peers when asked to label shown objects or their characteristics.

Lexical development showed no correlations with either production (r = 0.31, n = 30, p = 0.10) or reception (r= 0.02, n = 30, p = 0.90), which means that the lexical abilities had barely any influence on children performing these tasks.

Additionally, I compared the performance of children who had older siblings or visited daycare to firstborn children or children who stayed at home with their mothers, because the former are supposed to have more experience in triadic interaction than the latter. Here, correlations between overall production and birth order using Spearman coefficient did not reveal any significance (r = -0.13, n = 30, p = 0.48). Experience with triadic conditions, thus, does not seem to influence the children's production. In the reception tests, however, there was a high positive

correlation between birth order and overall reception (r = 0.62, n = 30, p = 0.00), suggesting that firstborn children tended to answer less reception questions correctly than secondborn. A comparison of the correlation coefficients for dyads (r=0.90, n=15, p=0.00) and triads (r=0.30, n=15, p=0.27) showed that this pattern is mainly due to the children's performance in the dyadic condition (z_{obs}=2.77), where secondborn children tended to answer more questions correctly than firstborn children.

The correlations of overall performance and daycare visit were not significant (overall production r = -0.20, n = 30, p = 0.30, overall reception r = 0.20, n = 30, p = 0.30).

In general, the results of overall performance were comparable across conditions. Note, however, that secondborn children in the dyadic condition tend to answer significantly more reception questions correctly than firstborns. One could speculate that this finding could be attributable to the secondborn children being more familiar to question-answer-routines as they not only experience them themselves, but also observe them going on between their mothers and siblings. This effect could be stronger in the dyadic condition because in the triadic condition even the firstborns are primed with a live triad.

2.5.2. Children's noun learning

A closer look differentiating the three word classes nouns, color adjectives and number words gave the following picture for nouns: Whereas in the production test, there is a slight advantage of the dyadic (40% of correct answers) compared to the triadic condition with 30% of correct answers, the pattern is reversed for reception where children in the dyadic condition scored 53.3% as opposed to 70% of correct answers in the triadic condition. Note that the difference between production and reception in the triadic condition is much more pronounced than in the dyadic condition (See Figure 8).

Mann-Whitney tests comparing children's noun performance in dyads vs. triads revealed no significant differences either for production (U=102 and p= 0.31 one-sided) or for reception (U=91.5 and p= 0.17 one-sided).

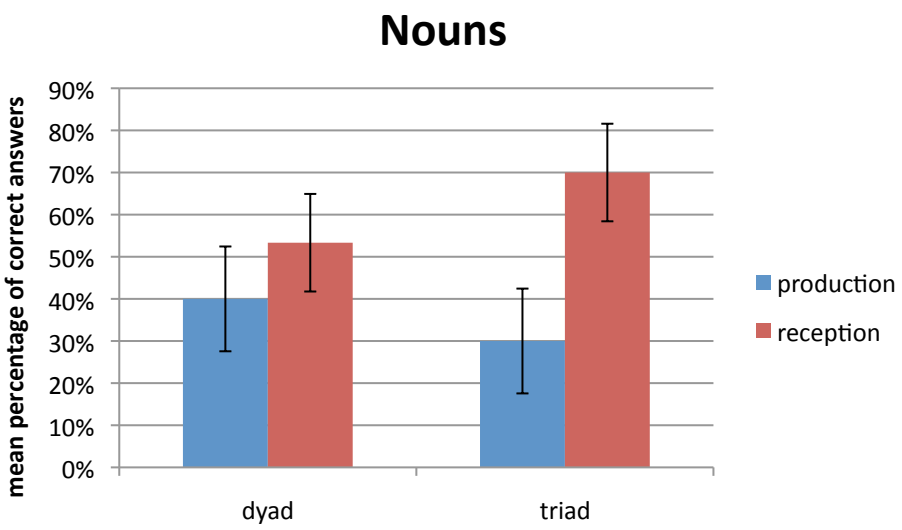


Figure 8: Learning success for nouns in the dyadic and triadic conditions

The children's performance was correlated with their lexical development for all three word classes to make sure that it would not only be the children who already had a relatively extensive lexicon who would learn the new words. For nouns, neither production nor reception correlated with the children's lexical development (production: r = 0.27, n = 30, p = 0.15 and reception: r = 0.05, n = 30, p = 0.80)

implying that the lexical development of the children did not influence their capacity of learning new nouns.

2.5.3. Children's color adjective learning

In the case of color adjectives, the results in the production tests where similar for dyads with 30% and triads with 26.7% of correct answers. In the reception tests, however, there was a big difference between the dyadic condition with 63.3% of correct answers and the triadic condition with less than half that score reaching only 30% of correct answers (see Figure 9).

A Mann-Whitney test for production revealed no significant differences between both conditions (U = 107 and p = 0.39 one-sided). The reception test, however, showed a significantly better score in case of direct face-to-face teaching (U = 72.5 and p = 0.03 one-sided) implying that children in the dyadic condition acquired a better understanding of color adjectives.

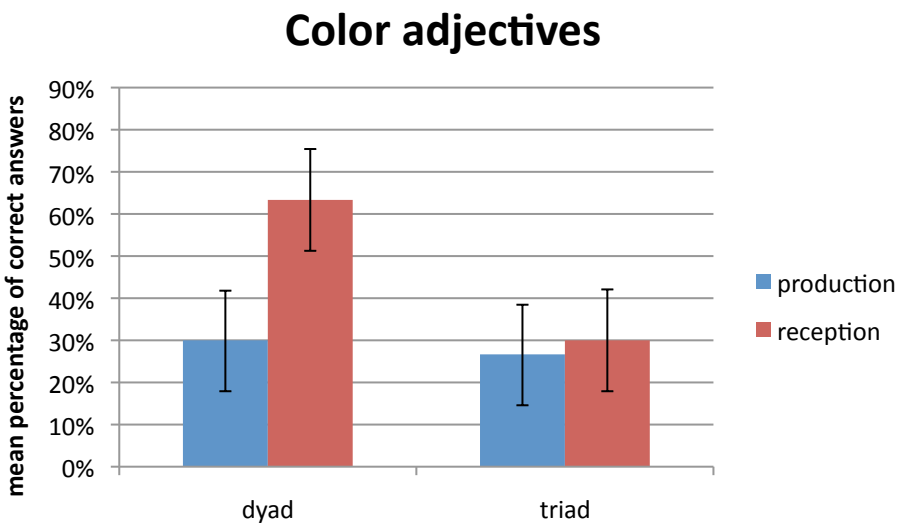


Figure 9:Learning success for color adjectives in dyadic vs. triadic conditions

Correlations between color adjective performance and the children's lexical development did not reach significance either for production (r = 0.30, n = 30, p = 0.13) or for reception (r = 0.10, n = 30, p = 0.60) implying that the size of the children's lexicon had no influence on their capacity of acquiring color adjectives.

2.5.4. Children's number word learning

The results of both, production and reception tests are quite uniform. In the production test, children in the dyadic and the triadic condition scored achieved 20% of correct answers. In the reception test there was a very slight advantage of the dyadic condition with 33.3% vs. 30% of correct answers in the triadic condition (see Figure 10).

Mann-Whitney test showed no significant differences in either the production test (U = 112.5 and p = 0.50 one-sided) or in the reception test (U = 107 and p = 0.40 one-sided).

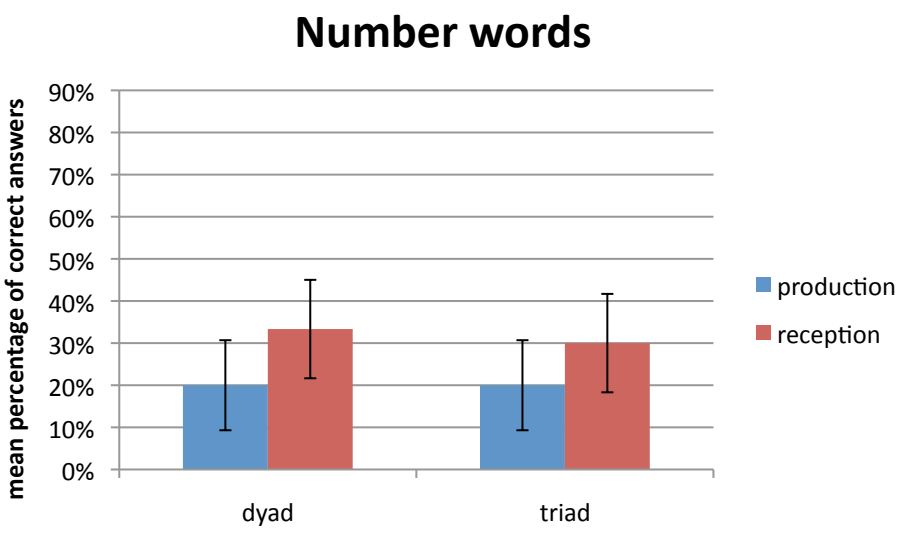


Figure 10: Learning success for number words in the dyadic and triadic conditions

As in the case of the nouns and the color adjectives, there were no correlations between number word performance and the children's lexical development either in production ($r = 0.05$, $n = 30$, $p = 0.80$) or in reception ($r = -0.13$, $n = 30$, $p = 0.50$).

In sum the analysis of the children's performance depending on different word classes gave the following insights: The results in the different word classes reflected the different degrees of difficulty, as the children scored better in the tests measuring learning success for nouns than for color adjectives than for number words. The only exception being the children's results in the reception tests for color adjectives where children in the dyadic condition scores significantly better than children in the triadic condition. This could be due to the observation that most parents had already begun to actively teach their children color words. Therefore most of the children already knew the basic color terms like red, blue or green. Another consequence of this beginning color word teaching could be that the children, thus, already acquired experience with a dyadic painting situation in which parents ask for crayons of different colors. This significant result would probably not have shown had I opted for transfer objects other than crayons.

2.6. Discussion

The first hypothesis tested with the present study was that children in the triadic condition would score better than children in the dyadic condition because they were presented with a model to imitate. This effect was expected to be specially pronounced in the case of the production test. Additionally, children were expected to imitate more when learning more difficult words, operationalized by teaching words from different word classes. The results, however, displayed no significant differences between the learning success of children in the dyadic and the triadic. Accordingly, the expected advantage of the triadic over the dyadic condition in the production test could not be verified and, thus, the hypothesis has to be rejected. Yet, it is important to emphasize that there was found no indication of a qualitative or quantitative disadvantage of triadic over dyadic word learning. Thus, listening in on other people's conversations seems to be as valid a context for learning linguistic items or

behaviors as face-to-face instructions. Yet, I observed a significant result of children's color adjective acquisition in the reception test where children in the dyadic condition tended to answer substantially better than children in the triadic condition – a somewhat unexpected finding that could be explained by the children being familiar with a corresponding dyadic drawing situation in which their parents ask them to hand over crayons of given colors and could, thus, perhaps been avoided by choosing other stimuli than crayons.

The second hypothesis stated that children with more experience with triadic interactions were supposed to achieve a higher learning success than children with less triadic experience. The amount of experience was operationalized by using daycare visit and birth order. Correlations between daycare visit and learning success did not reach significance – neither for production nor for reception implying that the experience with triadic or multi-party interactions two-year-olds have gathered through daycare visit does not (yet) enable them to be more successful in acquiring words from speech not addressed to them. The comparison between birth order and learning success, on the other hand, revealed a more complex pattern: whereas production did not seem to be influenced by birth order, secondborn children scored significantly better than firstborns in the reception tests where they tended to answer more questions correctly than firstborns – a bias that was especially pronounced in the dyadic condition. One possible explanation could be that this finding is due to the secondborn children being more familiar to question-answer-routines as they experience them both directly as a participant and indirectly as an observer of question-answer-routines going on between their mothers and siblings. This effect could be stronger in the dyadic condition because in the triadic condition even the firstborns are primed with a live triad.

The third hypothesis predicted a negative influence of shyness on production but not on reception due to the fact that the reception test did not require the children to speak. Although the corresponding correlation did not reach significance it still displayed a strong bias implicating that shyer children score lower than their less shy peers in the production but not in the reception tests. This result, unfortunately, does not have

enough force to allow a clear statement in favor of either the vocabulary-competence hypothesis or the anxiety-performance hypothesis.

The fourth hypothesis expected a positive correlation between the children's lexical development and their learning success stating that children with a more extensive lexicon could be better prepared to acquire new words – a hypothesis that has to be rejected implying that the size of the children's lexicon does not influence their ability to learn words from speech not addressed to them. This finding contradicts assumptions introduced in earlier studies that assume a link between children's ability to learn words through overhearing and the onset of the vocabulary spurt (Floor & Akhtar, 2006). As there have been no findings that triadic learning enhances the acquisition of new words this opens up the question what role triadic or multi-party interaction plays at the onset of language acquisition on other than the lexical level.

A second study, therefore, addresses the question of whether an assumed advantage of learning in triadic scenarios could arise on linguistic levels other than the lexicon. A revision of the literature on multi-party learning referred to above revealed that most reported benefits have been observed in the field of pragmatics. The crosslinguistic observations emphasize the importance of the constant immersion of the children in the everyday life of the community. Also, the data from the more situation centered communities revealed that the manner of instructing the children is strongly targeted on teaching them how to behave appropriately to the community's interaction rules (Heath, 1983; Ochs, 1986; Pye, 1986; Schieffelin, 1986; R. Scollon & S. B. K. Scollon, 1981). Pepperberg and Sherman's (2000, 2002) success in applying model/rival training to children with disabilities also mainly affects the children's pragmatic skills; they did not focus primarily on the acquisition of new knowledge but on the acquisition of appropriate behavioral patterns. Based on the study by Oshima-Takane et al. (1996) who were able to demonstrate an advance of children with more multi-party interaction experience in the acquisition of personal pronouns, investigation moves on and pursues the idea that it is not so much the acquisition of the lexical item itself but more the lack of opportunity to observe its correct usage, i.e. the unfamiliarity with contexts in which personal pronouns are typically used, that delays the production.

3. Learning linguistic behavior from pragmatically novel situations

The child's job [in language acquisition] is not only to figure out how to speak but how to behave
-Pye

In this second part of the thesis I will take a different view on language acquisition focusing not on word learning but on the acquisition of contextual knowledge about the situations in which lexical items are typically used. The aim is to provide evidence for the claim that triadic learning – although it does not seem to enhance word learning – can boost the acquisition of pragmatic knowledge. For this purpose, I will make use of the concept of frames in order to operationalize the verbal and nonverbal context that usually accompanies lexical items. This chapter begins with a reference to Pepperberg's work with grey parrots before moving on to an overview of the frame concept as it has been used in approaches to human communication in general and in child studies in particular. Subsequently, I will introduce the definition and operationalization of the frame concept used in the present study before presenting the experiment, its methodology and results.

According to Pepperberg's research with grey parrots (1997, 2002) it is important to note that Alex learned not only a great number of words from different word classes. More importantly, he also learned how to use the words to react to the tutor's questions or to get what he wanted. More specifically, he learned e.g. that a question requires an answer, a request an action or that the only way to get a nut was to ask for it. Pepperberg's model/rival training took the necessity of acquiring that kind of pragmatic and contextual knowledge into account by modeling what she described as the main factors of the training, which were *reference, functionality* and *social interaction.* The object-label-match corresponds to the reference part, whereas the question of how to use a label within the verbal and nonverbal context in order to achieve some outcome is in the focus of functionality and social interaction. This is

what made Pepperberg's work so remarkable: Alex not only parroted words but learned how to use them allowing a real communication to emerge.

This same aspect is vital for human communication, too: Whenever people use language it is not enough to simply utter words. Instead, it is important to use them in a way that is acceptable and interpretable for others as has been stated especially in speech act theory (Austin, 1967) and different pragmatic language acquisition approaches (Bruner, 1983; Ninio & Snow, 1996). For children acquiring language this means that it is not sufficient for them to learn verbal forms and their meanings but that they also have to learn in which contexts they are usually embedded to be able to use them in order to communicate with the people surrounding them in accordance with the conventions of the linguistic community they grow up in (Ninio & Snow, 1996). This last aspect is being analyzed in the field of developmental pragmatics that has been defined as the study of the acquisition of "knowledge necessary for the appropriate, effective, rule-governed employment of speech in interpersonal situations" (Ninio & Snow, 1996, p. 4). This kind of knowledge, however, in many cases goes beyond purely linguistic knowledge as the interpretation of even single words "in most uses requires an encyclopedic rather than a dictionary-based level of knowledge about the word's meaning" (Ninio & Snow, 1996, p. 8). This is why it seems to be impossible to study language detached from the contexts it naturally occurs in which is the main idea of the concept of frames. Frames provide "predictable, recurrent interactive structures" (Ninio & Snow, 1996, p. 171) that speakers seem to attach to their linguistic knowledge about a word in order to create the encyclopedic knowledge they need to use the word appropriately. And so the circle is complete because this differentiation between dictionary-based and encyclopedic knowledge made by Ninio and Snow (1996) corresponds to the main factors Pepperberg (1997, 2002) identified as vital for her model/rival training for parrots: *reference* on the one hand as the modeling of the object-label-match and *functionality* and *social interaction* on the other as the modeling of the pragmatics of the label use and the verbal and nonverbal context of the situation in which the word is applied. In the first experiment reported above the research question focused on reference: would children learn object-label-matches better in a dyadic or a triadic

condition? The pragmatic rules, on the other side, were familiar to the children and remained unchanged in both conditions: The new object-label-match was introduced using a fairly common question-answer-routine. On the basis of many of the above referred sociolinguistic and laboratory studies about learning in multi-party contexts, it has been suggested that the "benefit [of triadic or multi-party learning] involve pragmatic skills rather than the more strictly linguistic skills such as vocabulary size" (Barton & Tomasello, 1991, S 518). Therefore, for the second experiment, the research question is whether children acquire pragmatic knowledge better in dyadic or triadic conditions. The operationalization of the pragmatics of the teaching situation is based on the concept of frames as it has been introduced by developmental psychologists, such as Bruner (1983), Fogel (1993a, 1993b; 2006) and Tomasello (1999, 2003).

3.1. Frames in Communication

The concept of frames developed fairly simultaneously at the beginning of the 1970s in different scientific fields, namely cognitive psychology (Bateson, 2006), artificial intelligence (Minsky, 1975) and linguistics (Fillmore, 1976). In 1972 (2006), Gregory Bateson published "A Theory of Play and Fantasy", in which he introduced the concept of frames in cognitive psychology. During a zoo visit, while observing two young monkeys playing, it became clear to him that what he was observing was actually play and not combat although it displayed the same behavioral building blocks. From this he concluded that the monkeys had to be "capable of some degree of metacommunication, i.e., of exchanging signals which would carry the message 'This is play'" (2006, p. 316), thereby identifying or framing the event as a play-situation. In light of this observation, he drew attention to the fact that human (verbal) communication always operates on different explicit and implicit levels of abstraction. One of the mostly implicitly operating levels of abstraction is the metacommunicative level that defines the relationship established between the speakers. It is at this level that he locates frames as a means for the communicators to exchange "instructions or aids in [their] attempt to understand the messages included within the frame" (2006, p.

323). Thus, frames although difficult to take hold of still actively influence people's interpretation of given situations and, therefore, need to be taken into account when analyzing human interaction.

Another field, in which this concept occurred was sociology: Goffman (1974) transferred Bateson's frame concept into sociology creating his own definition with the aim to identify frames in naturally occurring conversations: "I assume that definitions of a situation are built up in accordance with principles of organization which govern events – at least social ones – and our subjective involvement in them; frame is the word I use to such of these basic elements as I am able to identify." (1974, p. 10). Goffman's frames emanate from the personal experience individuals have collected during their social life and are comparable for individuals coming from the same or similar societies. Their function consists in allowing "its user to locate, perceive, identify, and label a seemingly infinite number of concrete occurrences defined in its terms" (Goffman, 1974, p. 21). Frames, thus, are basic behavioral patterns acquired through personal experience that help individuals to structure and, therefore, simplify new situations in order to be able to interact with their environment. Goffman points out that the emergence and use of frames tend to be unconscious processes that nevertheless guide the doings of the individuals providing them with terms of reference for comparable situations (1974). As such, the acquisition of frames could precede and bootstrap the acquisition of verbal behavioral patterns.

In the field of artificial intelligence, frames were introduced by Minsky who described them as "the 'chunks' of reasoning, language, memory, and 'perception'" (1975, p. 212) and defined them as "data-structure for representing a stereotyped situation" (1975, p. 212). Minsky's term, however, differs from the other frame concepts presented here in that it is a static and non-interactional concept more suited to create artificial rather than mental representations. Still, it was a first attempt to make use of a cognitive approach for artificial intelligence.

In 1976, Fillmore presented his Theory of Frame Semantics (1976), which was based on his earlier works on case frames, as a central concept of case grammar (1968). He drew attention to the fact that mainstream generativist linguistics at that time tended to

analyze language only after abstracting it away from the contexts in which it naturally occurred. He, on the other hand, argued for taking into account the social functions of language, the nature of the speech production and comprehension processes, and the relationship between speech and its context. This had two important implications on the theory of language: First, word meaning would depend on the contexts in which it had been experienced, creating an inseparable unit he called cognitive or conceptual frame (1976, p. 24), and second, comprehension would be deeply influenced by the context in which an utterance would be heard and by the listener's memory of contexts in which the utterance had already been experienced – a unit he called interactional frame (1976, p. 24). Frames, in Fillmore's terms, are not language-dependent but are memory contents that are activated by exposure to linguistic forms in an appropriate context; he thus states that "the process of understanding a word requires us to call on our memories of experiences – selected, filtered, and generalized – through which we have learned the words in their labeling or describing functions." (1976, p. 27).

Fillmore's Frame Semantics served as a basis to formalize the concept of frames within the FrameNet project directed by Fillmore himself. Primary goal of the FrameNet project is to collect and systematize naturally occurring frames in a lexical database that can be used for several purposes as e.g. automatic labeling of semantic roles and semantic parsing (Gildea & Jurafsky, 2002), semantic dictionaries and aid for machine translation (Boas, 2002), theories of formal linguistics as e.g. construction grammar, where it has been integrated to codify semantic meaning (Goldberg, 1995), etc. But although this approach has been so productive, it still forces the scientists to collect an enormous amount of information in the database. Insights into how children acquire frames, how they develop over time and how they are made use of to support language acquisition could help to reduce this effort by pointing to a way of automatically acquiring new frames from observation. This argument has been made from the very beginning of frame theory by Bateson (2006, p. 317) as well as by Fillmore (1976, p. 30) who both suggested that the study of the developing language system of children would enrich the study of frames.

In the process of clarifying the term frames it is important to consider related fields: In cognitive science and artificial intelligence a corresponding term is "schema" to be found e.g. in the work of Rumelhart (1980) or Arbib (1987). The term "script" introduced in computational linguistics has been especially linked to the work of Abelson and Schank (1977). Additionally there are some terms that have been mentioned by different scientists who used already existing terms stating that they, however, would have preferred other terms. Fillmore e.g. talked also about "scenes" or "modules". Tannen, nevertheless, emphasizes that "all these complex terms and approaches amount to the simple concept of what R.N. Ross (1975) calls 'structures of expectations', that is, that, based on one's experience of the world in a given culture (or combination of cultures), one organizes knowledge about the world and uses this knowledge to predict interpretations and relationships regarding new information, events, and experiences" (Tannen, 1979, p. 139).

For the present work I will concentrate on the frame concepts as they have been defined by Bateson and Goffman as they both pay special attention to the social interactive character of frames. Thus, for the purpose of this thesis I will assume that a frame is an implicitly encoded social pattern which is acquired through experiencing social interactions in one's cultural environment and which contributes to the understanding of the message transferred within its scope. Still, this does not solve the problem that the approaches cited above do not give any explanation of how frames emerge and develop over time – a piece of information that could help to shed some light on the basic mechanisms underlying communication.

3.2. Frames in Developmental Psychology

In developmental psychology, frames are central concepts in the works of Bruner (1983) who calls them formats, Fogel, who speaks of (consensual) frames (1993a, 1993b; Fogel et al., 2006) and Tomasello, who first called them joint attentional scenes (1999) and later joint attentional frames (2003). I will present the different approaches with the aim of developing an understanding of the notion of 'frame' for the following study.

3.2.1. Bruner's Formats

Coming from Oxford, the birthplace of speech act theory, Bruner did not build on Bateson and Goffman's work but on Austin's (1967) argument "that an utterance cannot be analyzed out of the context of its use and its use must include the intention of the speaker and interpretation of that intention by the addressee in the light of communication conventions" (Bruner, 1983, p. 36). His argument is that if a child needs to interpret intentions – even at a very basic level – she must take into account not only the structure of the utterance she is hearing but also the "nature of the conditions that prevail just at the time the utterance is made" (1983, p. 37), in other words: the context in which the utterance is embedded. So, Bruner claims that language acquisition is not synonymous to word learning but to a pragmatically driven speech act learning, where the child's "primitive 'speech act' patterns may serve as a kind of matrix in which lexico-grammatical achievements can be substituted for earlier gestural or vocal procedures" (1983, p. 38). If children, however, need this matrix then there must be somebody providing it. Bruner, therefore, claims that the development of language is only possible through a negotiation process between two people: the child, who is to learn a speech act, and an adult providing the social and conceptual experience necessary for its acquisition. So, the argument is that children learn how to use a particular piece of language by being presented with instances of the correct use of that particular piece of language. In Bruner's account the adult language teacher becomes more important because he is the one who provides the "'arranged' input of adult speech [the child needs if he] is to use his growing grasp of conceptual distinctions and communicative functions as guides to language use. [This] 'arranging' of early speech interaction requires routinized and familiar settings, formats, for the child to comprehend what is going on, given his limited capacity for processing information." (1983, p. 39). It is this functional framing of communicative acts that paves the way for the child's former language learning. Children learn about communicative situations and their constituents, including the participants' roles in these situations. With experience, they learn that the roles they observe within the frames presented by their caregivers are interchangeable which allows them to assume

different roles in one and the same format. A format in Bruner's words "is a standardized, initially microcosmic interaction pattern between an adult and an infant that contains demarcated roles that eventually become reversible" (1983, p. 120). Thus, Bruner not only highlights the interactive character of formats but also their relevance for language teaching: By arranging the contexts into special child-appropriate formats the adult assists the child in detecting the key elements of the situation and provides him with behavioral examples she might imitate in comparable future situations.

3.2.2. Fogel's Consensual Frames

Fogel and Tomasello, on the other hand, base their frame concepts on Bateson's and Goffman's as well as Bruner's work. Fogel defines frames as "regularly recurring patterns of communication." (Fogel et al., 2006, p. 3). By way of an example, Fogel et al. refer to recurring topics in conversation and interaction rituals as e.g. bedtime stories. They emphasize that frames recur repeatedly over longer periods of time and "are reconstituted dynamically and dyadically each time they reappear" (2006, p. 3) by which they are enhanced. Based on Adam Kendon's work, Fogel (1993a, 1993b) identified the following basic constituents of a face-to-face frame that communicators have to agree on before communication can occur:

1. Attention direction: Face-to-face encounters tend to be extremely complex, displaying all types of signals that can or cannot be found to have a communicative function. Thus, it is important for the communicators to agree on which aspects of the situation they have to pay attention to and to which they do not. The example Fogel gives is toddler-parent-interaction, where the participants seem to have a mutual agreement that the focus of attention is on the content of the toddler's utterance and not on its form (1993a, p. 38).

2. Spatial location: Any direct face-to-face communication requires a spatial location that tends to interact with the character of the communication.

Factors like distance between the communication partners or amount of touching that is permitted e.g. can depend on cultural rules, type of interaction or level of intimacy that exists between both communicative partners.

3. Postural orientation: This refers to the way the two communicators are oriented towards each other, e.g. facing each other, next to each other, both standing, both sitting, one standing, one sitting, etc.

4. Topic: Establishment of the common topic of the interaction.

For the design of the present study I made use of this idea of breaking frames down into their components to operationalize the familiarity of frames. The main logic was to analyze the situation – or frame – used in experiment 1 to introduce the new word, identify its most important constituents, such as the ostension used to gather the child's attention, the means to direct his/her attention to the object in question as well as the way question and answer are realized, and manipulate some of this key elements in order to alienate the familiar frame creating an unfamiliar frame condition.

3.2.3. Tomasello's Joint Attentional Scenes or Frames

Tomasello defines joint attentional scenes as "social interactions in which the child and the adult are jointly attending to some third thing, and to one another's attention to that third thing, for some reasonably extended length of time" (1999, p. 97). As for language acquisition, he states that linguistic reference is understandable only if embedded in joint attentional scenes or, as he puts it later, "children understand adult communicative intentions, including those expressed in linguistic utterances, most readily inside the common ground established by joint attentional frames" (2003, p. 24). This stands in opposition to the traditional (context-independent) match between a symbol and its referent. He emphasizes that joint attentional scenes need to be distinguished from the child's perceptual world as well as from the child's linguistic world, as joint attentional scenes, on the one hand, constitute only a subset of what the

child perceives and, on the other hand, encode more than any one linguistic symbol. The purpose of joint attentional scenes in Tomasello's words is to "simply provide the intersubjective context within which the symbolization process occurs" (1999, p. 99), thereby providing cues about how to understand and interpret the linguistic symbol. Following Bruner's argument, Tomasello highlights that joint attentional scenes or frames give the child a possibility to represent the situation observed including herself "from the […] 'outside' perspective" (2003, p. 22), making her aware that she is basically playing a role in that particular scene (1999, 2003). This is the basis for the child to understand that there are several roles displayed in a joint attentional scene and that she is not bound to assume only one of these roles but that she can choose from the roles at hand, which enables her to role-reversed imitation (1999, 2003). In later work Tomasello preferred to use the term "joint attentional frame" instead of "joint attentional scene", although he used it synonymously (2003). He underlines that "joint attentional frames are defined intentionally, that is, they gain their identity and coherence from the child's and the adult's understandings of 'what we are doing' in terms of the goal-directed activities in which we are engaged. […] This enables the child […] to create the common ground within which she may understand the adult's communicative intentions when the adult uses a novel piece of language – at least partly by creating a domain of 'current relevance'" (1999, p. 22). With this, Tomasello emphasizes the importance a skillful employment of frames can have for language teaching as it provides the child with a model of an interaction. Unlike Bruner, Tomasello does not regard frames as a means to learn speech acts but behavioral patterns in general giving frames a much wider scope.

The developmental perspective on frames makes clear that they are much more than implicitly coded knowledge used to enrich one's understanding of a given utterance in a given situation. Instead, frames seem to facilitate children's access to the communicative principles that guide social interaction and could therefore bootstrap the acquisition of language.

3.2.4. Natural pedagogy

Although Senju and Csibra never used the term 'frame' themselves, they procured evidence that gaze following in infants depends on the use of ostensive contexts (2008). In an eye tracking experiment they presented 6-month-old infants with a recording of an experimenter directing her gaze to one of two toys located on her left or right hand side. The experimental conditions varied in whether the experimenter made use of ostensive signals – eye-gaze or infant-directed speech – or not. The results showed that infants only followed the experimenter's gaze when preceded by an ostensive signal – a link that the authors concluded could facilitate the infants to "respond to referential communication directed to them" (Senju & Csibra, 2008, p. 668). In other words: The use of communicative signals in adult-infant communication could arouse the infant's expectation of being presented with a relevant piece of information. Transferred to frames this result means that the ostensive signal marks the beginning of a communicative frame within which the infants expects the adult to present some interesting information. According to Csibra and Gergely (2009) this sensitivity of human infants to ostensive signals in adult-infant-communication allows infants and their caretakers to establish a special communication system called natural pedagogy that facilitates generic knowledge teaching and acquisition. Thus, Senju and Csibra (2008) provide an empirical possibility to analyze the development of frames by presenting children with more or less familiar frames observing the effect this has on the children: Most of the times an adult addresses a child he does so by using ostensive signals. Thus, this situation is familiar to the child, whereas the situation without ostensive signals tends to be the exception and might, therefore, be less familiar to the child.

Although there seems to be a certain agreement in developmental pragmatics that frames do play a role in language acquisition, up to now this role has been claimed only for dyadic interactions. Bruner's definition of formats, e.g., explicitly states so: A format "is a standardized, initially microcosmic interaction pattern *between an adult and an infant* that contains demarcated roles that eventually become reversible" (1983, p. 120, emphasis added). Fogel claims that frames are learned because they recur repeatedly over time and "are reconstituted dynamically and *dyadically* each time they

reappear" (2006, p. 3, emphasis added). And Tomasello's definition does not take into account a triadic or multi-party interaction, either: joint attentional scenes are "social interactions in which *the child and the adult* are jointly attending to some third thing, and to one another's attention to that third thing, for some reasonably extended length of time" (1999, p. 97, emphasis added). On the other hand, it is now widely acknowledged that children learn language not only in dyadic but also in triadic and multi-party contexts, which makes it necessary to also look into the role frames assume in these contexts.

The concept of frames allows for a distinction between the object-label relation established by a word and the context in which it is typically observed facilitating empirical studies to explore the acquisition of pragmatic knowledge and the role it plays for the process of language acquisition in general. In the current experiment, I will, thus, make use of this possibility in order to present children with unfamiliar frames in dyadic and triadic contexts.

3.3. Hypotheses for the current study

As stated above, the introduction of the frame concept provides the opportunity of distinguishing between word learning and frame learning, which corresponds to Pepperberg's distinction between reference on the one hand and functionality and social interaction on the other. In the first experiment, the research question was whether the children would learn words – or reference – better in triadic than in dyadic conditions – a hypothesis that had to be rejected. In the second experiment, the question will be whether children learn frames – or functionality and social interaction – better in triads than in dyads. For this purpose it was necessary to operationalize frame familiarity. The first experiment made use of a known situation, i.e. a familiar frame based on a common question-answer-routine as the ones used by parents when teaching new words to their children. For the contrasting, i.e. the unfamiliar frame condition, the familiar frame was manipulated with the aim of placing the child in an unfamiliar situation in which he or she not only needs to learn the correct answer but also how to answer frame-appropriately, as the children in the unfamiliar condition

were supposed to answer not by uttering the correct word but by placing their hand on one of three displays placed in front of them.

I expected children to learn unfamiliar frames better in triads than dyads given that they were presented with a model whose behavior they could imitate, therefore facilitating the task. This effect was expected to augment with increasing task difficulty because the more difficult the task gets the less possibility the children would have to bring in own knowledge given that both, the new label and the embedding frame were unfamiliar to them. Therefore, their best chance to answer the test questions correctly would be to make use of all the cues included in the teaching situation which would leave them with the only possibility to copy the model's behavior.

Children who have gathered more experience with triadic and multi-party interactions operationalized by daycare visit and birth order were supposed to be more prepared to handle the triadic teaching situation and are thus, expect to score better than their peers.

As both, production and reception test could be solved without having to speak lexical development and level of shyness were not expected to influence children's performance.

3.4. Method

This chapter deals with the method applied to operationalize familiar vs. unfamiliar frames. It begins with the description of the table we used for the operationalization and describes the group of participating children. It explains the differences in the methodology of the follow-up experiment in relation to the first experiment and gives a detailed overview of the adopted procedure. The chapter concludes with a presentation of the test procedure employed to measure learning success.

3.4.1. Familiar vs. Unfamiliar Frame

Following Fogel's idea of breaking frames down into their constituents, the first step to create familiar and unfamiliar frame conditions was to analyze the familiar frame used in experiment 1 which revealed the following parts:

a. **Ostension** has the function to call the child's attention and announce a teaching situation. The ostension used here is eye contact and calling the child by his/her given name (Senju & Csibra, 2008),

b. The object in question is **singled out** by pointing to it, thereby directing the child's attention to the object in question (Gliga & Csibra, 2009),

c. The **question** asked for objects is "What's that?", for colors "What's the color of that block?", and for numbers "How many buttons are these?" (Ninio & Snow, 1996),

d. The **answer is given** by uttering the label of the object in question or one of its characteristics (Ninio & Snow, 1996).

For the contrasting condition, this familiar frame was manipulated in order to face the child with an unfamiliar frame: While ostension and questions remained the same, the named object will now be highlighted by elevating it or illuminating it from underneath using hidden switches located under the table at the side where experimenter 1 is seated, and the answer is not given by uttering a word but by placing one's hand on one of three displays located in front of the child. For a comparison of the two experimental conditions see Figure 11 below. The child's task in the unfamiliar frame is two-fold: On the explicit level, he or she needs to learn the correct answer, and on the implicit level he or she needs to learn that, when an object is singled out not by pointing but by illuminating or elevating it, the answer needs to be given by placing one's hand on the correct display and not by uttering a word.

	Familiar frame	Unfamiliar frame
Ostension	Eye contact + calling the child by his/her given name	
Highlighting	Pointing	Illuminating/elevating
Question	"What's this?" for nouns, "What's the color of this block?" for color adjectives, "How many buttons are these?" for number words	
Answer	Word production	Touching the correct display

Figure 11: Comparison of the familiar and unfamiliar experimental conditions

3.4.2. The table allowing for unfamiliar frame

For this experiment, a special table from a carpenter was ordered (See Figure 12 below). It is an ivory-colored round table of child appropriate size (height: 55cm, diameter of the table top: 77cm). In the middle of the table, there are three quadrangular adjoining platforms, each equipped with a round acrylic glass with a matt finish. The acrylic glass serves to hide a light bulb that allows experimenter 1 to illuminate objects that are placed on the glass from underneath using hidden switches placed under the table on the side where she is seated. Additional switches enable the experimenter to turn on small motors hidden in the table leg that move the quadrangular platforms elevating any object that had been placed on one of the platforms.

Additionally, the table comes with a disk hidden underneath the tabletop, which can only be seen in front of the child and experimenter 1. The experimenter has the possibility of turning the disk to place four possible displays in front of the child. One

is completely empty, one features three abstract pictures of the presented objects, one features three colored patches and one three pictures of different quantities of red dots.

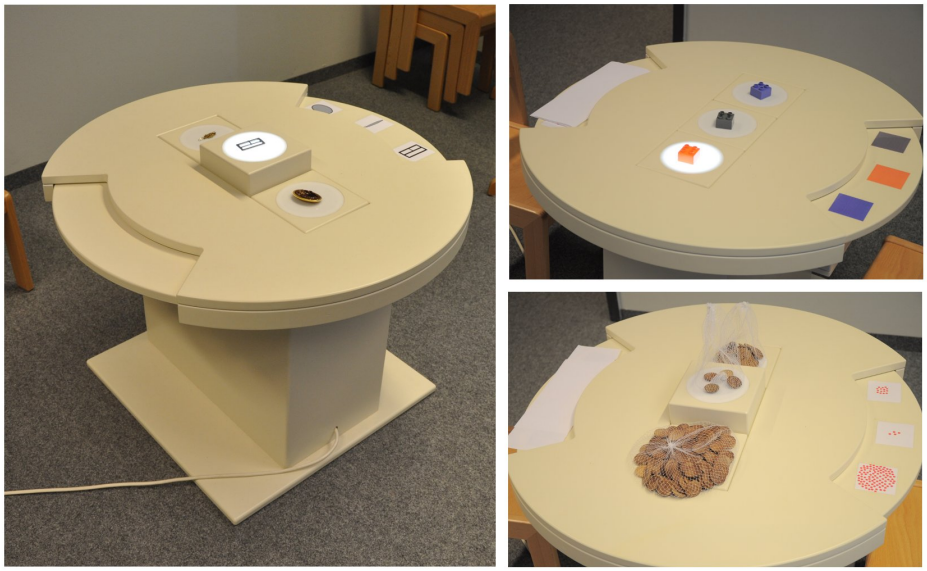


Figure 12: The table used in the experiment

3.4.3. Participants

36 children aged 25 through 28 months (M = 25.8, SD = 1.2) participated in the study. All children were native German speakers and lived in Bielefeld and surroundings.

Of the 36 children (17 girls, 19 boys) who participated in the study 6 (2 girls, 4 boys) had to be excluded due to fussiness (2 boys) or non-compliance (2 girls, 2 boys). The sample, therefore, consisted of 30 children, 15 boys and 15 girls.

3.4.4. Conditions

The design of this second experiment was parallel to the design used in the first experiment with the exception that we manipulated the familiarity of the frame.

Experimenter 1, thus, did not point to an object to direct the child's attention toward it, but instead made use of the table's possibilities by elevating or illuminating one of the objects from underneath using the hidden switches located under the table top. Furthermore, there was a display placed in front of the child to provide an unfamiliar possibility for responding to the experimenter's questions (see Figure 13).

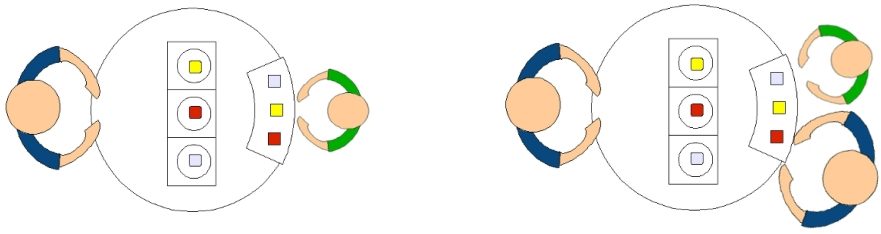


Figure 13: The two experimental conditions – unfamiliar dyadic vs. unfamiliar triadic teaching condition

3.4.5. Stimuli

As in the case of the first experiment, children were taught labels for different pieces of jewelry, color adjectives denominating less common colors, and number words denominating different set sizes.

For nouns the display placed in front of the child featured abstract images of the objects (see Figure 14).

Figure 14: Stimuli and displays for the presentation and transfer of

For the color adjectives the display was endowed with color patches of approximately 5x5cm (see Figure 15).

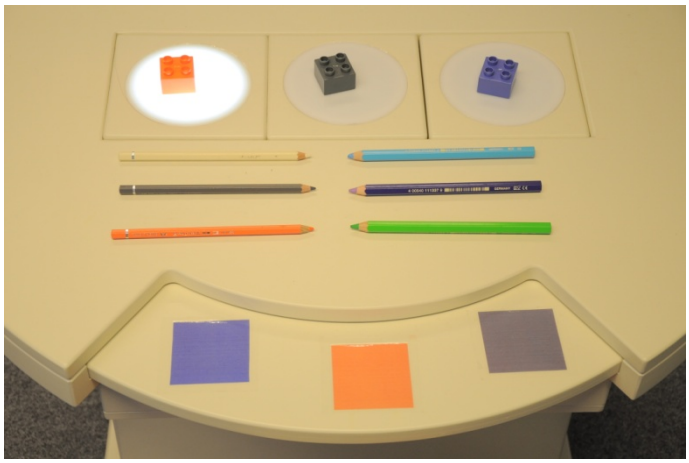


Figure 15: Stimuli and displays for the presentation and transfer of color adjectives

For the number words the display featured pictures with equivalent numbers of red dots (see Figure 16).

Figure 16: Stimuli and displays for the presentation and transfer of number words

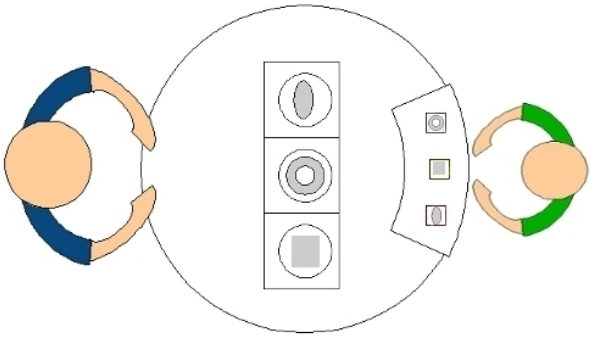
3.4.6. Setting

The setting was the same than in the first experiment. For a sketch of the experimental setting see Figure 5 on page 38.

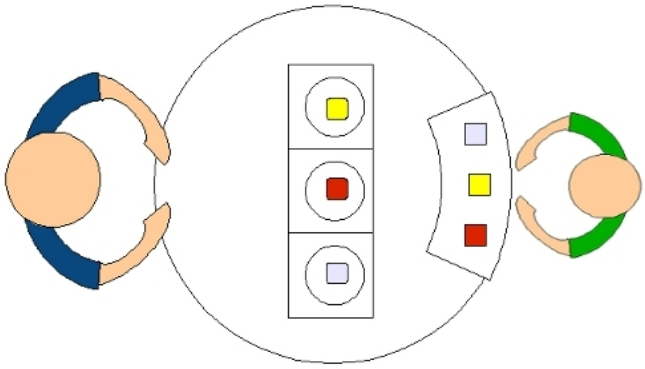
3.4.7. Procedure

The procedure did not vary from that of the first experiment. Variations only concerned the scripts for the teaching phases, which are included below.

3.4.7.1. Dyadic teaching

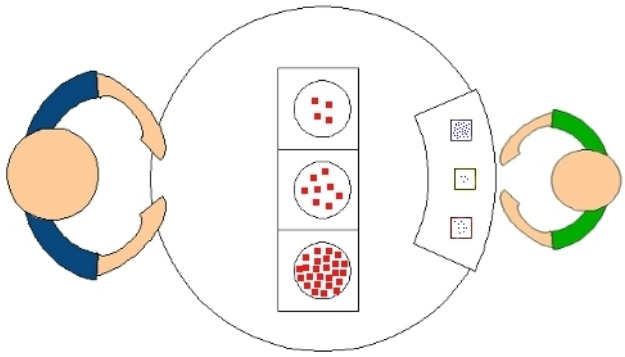
<table>
<tr><td colspan="2">Object label. The child was seated at the table in front of experimenter 1. The table was completely empty. Experimenter 1 placed the object display in front of the child, took three objects out of a closed box that was located next to her and placed them on the three platforms located halfway between the child and herself.</td></tr>
<tr><td colspan="2">  </td></tr>
<tr><td>1. Experimenter 1 focuses on the child and catches her attention by calling her by her given name
2. Experimenter 1 activates the table thus elevating and illuminating one of the objects from underneath (gaze to object)
3. Experimenter 1: “Was ist das? “(gaze to child)
4. Experimenter 1 places her hand on the correct display (gaze at child)
5. Experimenter 1: “Ja, richtig. Brosche. Das ist eine Brosche.“ (gaze at child)
6. Experimenter 1 picks up the brooch and explores it (3 sec)
7. Experimenter 1: “Legen wir das mal wieder auf den Tisch.“ (puts the object back on the table)</td><td>3. “What’s that?”
5. “Yes correct, brooch. That’s a brooch.”
7.“Let’s put that back on the table”</td></tr>
<tr><td>1. Experimenter 1 focuses on the child and catches her attention by calling her by her given name
2. Experimenter 1 activates the table thus elevating and illuminating the same object from underneath (gaze to object)
3. Experimenter 1: “Was ist das?“ (gaze to child)
4. Experimenter 1 places her hand on one of the incorrect displays (gaze at child)
5. Experimenter 1: „Nein!“ (shakes her head and re-places her hand on the correct display)
„Brosche. Das ist eine Brosche.“ (gaze at child)
6. No exploration of the object (pause)
7. Experimenter 1 removes all items from the table</td><td>3. “What’s that?”
5.“No! Brooch. That’s a brooch.”</td></tr>
</table>

Color adjective. The child was seated at the table in front of experimenter 1. The table was completely empty. Experimenter 1 placed the color display in front of the child, took three building blocks of different colors out of a closed box that was located next to her and placed them on the three platforms located halfway between the child and herself.



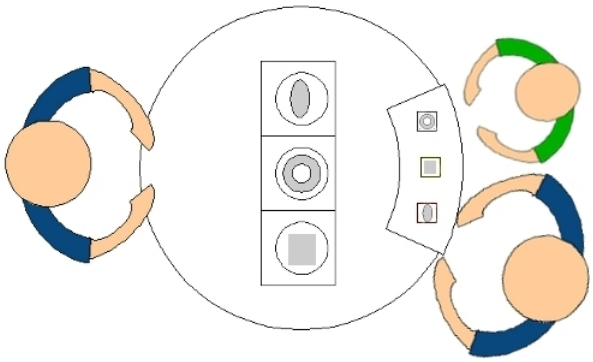
1. Experimenter 1 focuses on the child and catches her attention by calling her by her given name 2. Experimenter 1 activates the table thus illuminating one of the blocks from underneath (gaze to block) 3. Experimenter 1: *"Welche Farbe hat der Klotz?"* (gaze to child) 4. Experimenter 1 places her hand on the correct display (gaze at child) 5. Experimenter 1: *"Ja, richtig. Grau. Das ist ein grauer Klotz."* (gaze at child) 6. Experimenter 1 picks up the building block and explores it (3 sec) 7. Experimenter 1: *"Lass uns das mal wieder auf den Tisch legen."* (puts the block back on the table)	3. *"What's the color of that block?"* 5. *"Yes correct, gray. That's a gray block."* 7. *"Let's put that back on the table."*
1. Experimenter 1 focuses on the child and catches her attention by calling her by her given name 2. Experimenter 1 activates the table thus illuminating the same block from underneath (gaze to object) 3. Experimenter 1: *"Welche Farbe hat der Klotz?* "(gaze to child) 4. Experimenter 1 places her hand on one of the incorrect displays (gaze at child) 5. Experimenter 1: *„Nein!"* (shakes her head and re-places her hand on the correct display) *„Grau. Das ist ein grauer Klotz."* (gaze to child) 6. No exploration of the building block (pause) 7. Experimenter 1 removes all items from the table	3. *"What's the color of that block?"* 5. *"No! Gray. That's a gray block."*

Number word. The child was seated at the table in front of experimenter 1. The table was completely empty. Experimenter 1 placed the number display in front of the child, took three nets containing different sets of buttons out of a closed box that was located next to her and placed them on the three platforms located halfway between the child and herself.



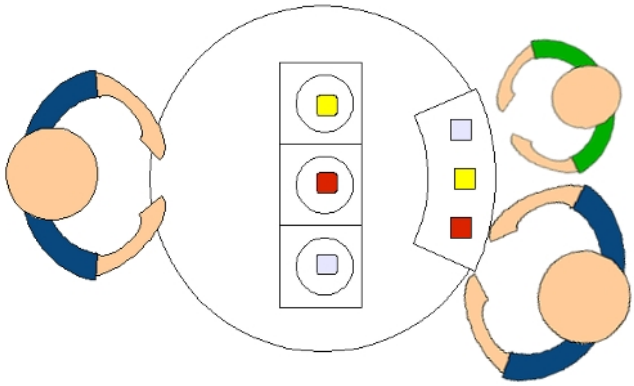
1. Experimenter 1 focuses on the child and catches her attention by calling her by her given name 2. Experimenter 1 activates the table, thus elevating one of the button sets (gaze to buttons) 3. Experimenter 1: *"Wieviele Knöpfe sind das?* "(gaze to child) 4. Experimenter 1 places her hand on the correct display (gaze at child) 5. Experimenter 1: *"Ja, richtig. Zwölf. Das sind zwölf Knöpfe."* (gaze at child) 6. Experimenter 1 picks up the net of buttons and explores it (3 sec) 7. Experimenter 1: *"Legen wir das mal wieder auf den Tisch."* (puts the buttons back on the table)	3. *"How many buttons are these?"* 5. *"Yes, correct, twelve. These are twelve buttons."* 7. *"Let's put that back on the table."*
1. Experimenter 1 focuses on the child and catches her attention by calling her by her given name 2. Experimenter 1 activates the table, thus elevating the same button set (gaze to buttons) 3. Experimenter 1: *"Wieviele Knöpfe sind das?* "(gaze to child) 4. Experimenter 1 places her hand on one of the incorrect displays (gaze at child) 5. Experimenter 1: *„Nein!"* (shakes her head and re-places her hand on the correct display) *„Zwölf. Das sind zwölf Knöpfe."* (gaze at child) 6. No exploration of the net (pause) 7. Experimenter 1 removes all items from the table	3. *"How many buttons are these?"* 5. *"No! Twelve. These are twelve buttons"*

3.4.7.2. Triadic teaching

<table>
<tr><td colspan="2">Object label. The child was seated at the table in front of experimenter 1 and next to experimenter 2. The table was completely empty. Experimenter 1 placed the object display in front of the child and experimenter 2, took three objects out of a closed box that was located next to her and placed them on the three platforms located halfway between the child and herself.</td></tr>
<tr><td colspan="2">  </td></tr>
<tr><td>1. Experimenter 1 focuses on experimenter2 and catches her attention by calling her by her given name
2. Experimenter 1 activates the table, thus elevating and illuminating one of the objects from underneath (gaze to object)
3. Experimenter 1: “Was ist das? “(gaze to experimenter 2)
4. Experimenter 2 places her hand on the correct display (gaze to experimenter 1)
5. Experimenter 1 places her and on the correct display saying “Ja, richtig. Brosche. Das ist eine Brosche.“ (gaze at experimenter 2)
6. Experimenter 1 hands the brooch to experimenter 2 who explores it (3 sec)
7. Experimenter 1: “Legen wir das mal wieder auf den Tisch.” (holds out her hand for the object, receives it and puts it back on the table.)</td><td>3. “What’s that?”
5. “Yes correct, brooch. That’s a brooch.”
7. “Let’s put that back on the table.”</td></tr>
<tr><td>1. Experimenter 1 focuses on experimenter 2 and catches her attention by calling her by her given name
2. Experimenter 1 activates the table, thus elevating and illuminating the same object from underneath (gaze to object)
3. Experimenter 1: “Was ist das? “(gaze to experimenter 2)</td><td>3. “What’s that?”</td></tr>
</table>

4. Experimenter 2 places her hand at one of the incorrect displays (gaze to experimenter 1) 5. Experimenter 1: *„Nein!“* (shakes her head and places her hand at the correct display) *„Brosche. Das ist eine Brosche.“* (gaze to child) 6. No exploration of the object (pause) 7. Experimenter 1 removes all items from the table	5. *“No! Brooch. That’s a brooch.”*

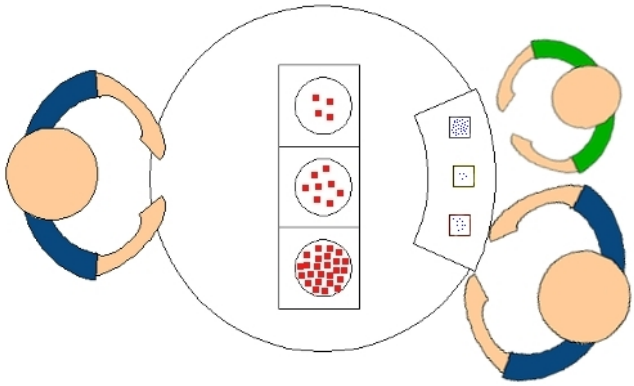
Color adjective. The child was seated at the table in front of experimenter 1 and next to experimenter 2. The table was completely empty. Experimenter 1 placed the color displays in front of the child and experimenter 2, took three color blocks of different colors out of a closed box that was located next to her and placed them on the three platforms located halfway between the child and herself.



1. Experimenter 1 focuses on experimenter2 and catches her attention by calling her by her given name 2. Experimenter 1 activates the table, thus illuminating one of the blocks from underneath (gaze to block) 3. Experimenter 1: *"Welche Farbe hat der Klotz?"* (gaze to experimenter 2) 4. Experimenter 2 places her hand on the correct display (gaze to experimenter 1) 5. Experimenter 1 places her hand at the correct display saying *"Ja, richtig, grau. Das ist ein grauer Klotz."* (gaze to experimenter 2) 6. Experimenter 1 hands the block to experimenter 2 who explores it (3 sec) 7. Experimenter 1: *"Legen wir das mal wieder auf den Tisch."* (holds out her hand for the block, receives it and puts it back on the table.)	3. *"What's the color of that block?"* 5. *"Yes correct, gray. That's a gray block."* 7. *"Let's put that back on the table."*
1. Experimenter 1 focuses on experimenter 2 and catches her attention by calling her by her given name 2. Experimenter 1 activates the table, thus illuminating the same block from underneath (gaze to block) 3. Experimenter 1: *"Welche Farbe hat der Klotz?"* (gaze to experimenter 2) 4. Experimenter 2 places her hand on one of the incorrect displays (gaze to experimenter 1) 5. Experimenter 1: *„Nein!"* (shakes her head and places her hand on the correct display)	3. *"What's the color of that block?"* 5. *"No! Gray. That's a gray*

„Grau. Das ist ein grauer Klotz.“ (gaze at experimenter 2) 6. No exploration of the object (pause) 7. Experimenter 1 removes all items from the table	*block.”*

Number word. The child was seated at the table in front of experimenter 1 and next to experimenter 2. The table was completely empty. Experimenter 1 placed the number displays in front of the child and experimenter 2, took three nets containing different sets of buttons out of a closed box that was located next to her and placed them on the three platforms located halfway between the child and herself.



1. Experimenter 1 focuses on experimenter2 and catches her attention by calling her by her given name 2. Experimenter 1 activates the table, thus elevating one of the sets of buttons (gaze to buttons) 3. Experimenter 1: *"Wieviele Knöpfe sind das?* "(gaze to experimenter 2) 4. Experimenter 2 places her hand on the correct display (gaze to experimenter 1) 5. Experimenter 1 places her hand on the correct display saying: *"Ja, richtig, hundert. Das sind hundert Knöpfe."* (gaze at experimenter 2) 6. Experimenter 1 hands the net to experimenter 2 who explores it (3 sec) 7. Experimenter 1: *"Legen wir das mal wieder auf den Tisch."* (holds out her hand for the buttons, receives them and puts them back on the table.)	3. *"How many buttons are these?"* 5. *"Yes correct, a hundred. These are a hundred buttons."* 7. *"Let's put that back on the table."*
1. Experimenter 1 focuses on experimenter 2 and catches her attention by calling her by her given name 2. Experimenter 1 activates the table, thus elevating the same set of buttons (gaze to buttons) 3. Experimenter 1: *"Wieviele Knöpfe sind das?* "(gaze to experimenter 2) 4. Experimenter 2 places her hand on one of the incorrect displays (gaze to experimenter 1) 5. Experimenter 1: *„Nein!"* (shakes her head and places her hand on the correct display) *„Hundert.*	3. *"How many buttons are these?"* 5. *"No! A hundred. These are a hundred buttons."*

Das sind hundert Knöpfe.“ (gaze to experimenter 2) 6. No exploration of the buttons 7. Experimenter 1 removes all items from the table	

3.4.8. Test procedure

For the production test, the test procedure from the first experiment was adapted. The child was asked to produce the linguistic behavior after singling out the object by elevating or illuminating it from underneath. The child was supposed to place his hand on the same display experimenter 1 or experimenter 2 had placed her hand on before.

The reception test was adopted from the first experiment without any modifications.

3.4.9. Dependant variables

The same dependant variables were collected than in the first experiment, namely word production, word reception, daycare visit and birth order as operationalization of the children's experience with triadic or multi-party interactions, lexical development, and level of shyness. The only difference consisted in the criteria for measuring learning success using production: children could score between 0 and 2 points. They got two points for correct and frame-appropriate production when they placed their hand on the correct display when asked for the label of the taught object. In case they did not place their hand on the display but uttered the correct word, they got only one point for correct production, and in the case in which the children either did not answer at all or answered incorrectly they got no points.

3.5. Results

Given that the data were not normally distributed (Kolmogorov-Smirnov $df = 15$, $p < 0.05$), Mann-Whitney tests for overall production and reception were performed.

As in experiment 1, several correlations were computed between the children's performance and factors such as lexical development, shyness, and experience with triadic situations operationalized by birth order and daycare experience.

3.5.1. Children's overall performance

In the production tests, children in the triadic condition scored better than children in the dyadic condition achieving 50% of correct answers in comparison to 33.3% in the dyadic condition. The scores for the reception test display a reversed pattern with 38.9% of correct answers in the dyadic and only 31.1% of correct answers in the triadic condition (see Figure 17).

Mann-Whitney tests for overall production and reception showed no significant differences between performance in the dyadic and the triadic condition (production: $U = 84$, $p = 0.11$, one-sided; reception: $U = 93$, $p = 0.20$, one-sided).

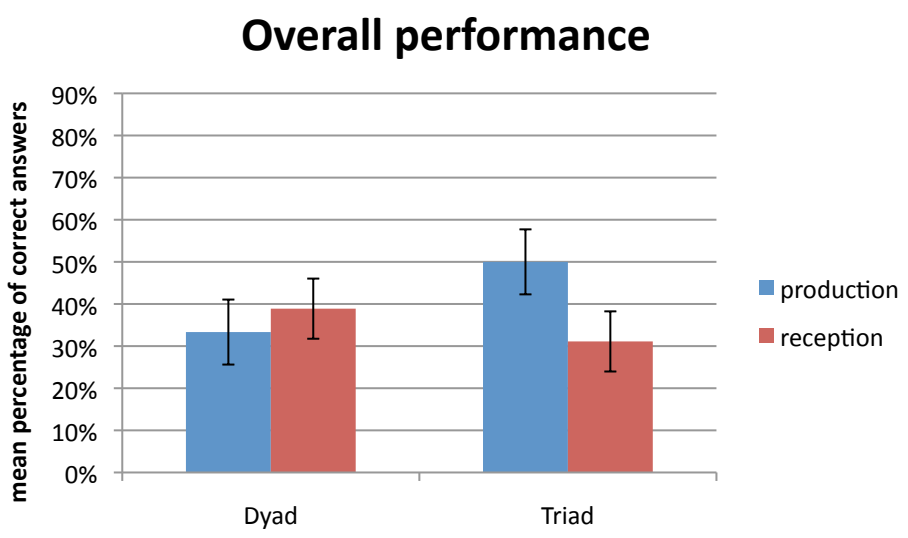


Figure 17: Overall performance in the unfamiliar dyadic and triadic conditions

Correlations between the children's gender and their overall performance using Spearman coefficient revealed that there were no significant differences in learning

success between boys and girls (overall production: r = -0.09, n = 30, p = 0.63; overall reception: r = 0.13, n = 30, p = 0.49). Correlations of overall performance and shyness using Spearman coefficient displayed no influence of shyness on production (r = -0.05, n = 30, p = 0.80) or reception (r = -0.18, n = 30, p = 0.66). This suggests that children who were reported as shy performed similarly to their peers. In addition, lexical development had no significant influence on children's performance (production: r = 0.31, n = 30, p = 0.10; reception r = 0.09, n = 30, p = 0.63) implying that children displayed similar capabilities of learning new words independently from the size of their lexicon.

As in experiment 1, I compared the performance of children, who had older siblings or visited daycare, to firstborn children or children who stayed at home with their mothers, because the former are supposed to have more experience in triadic interaction than the latter. Here, correlations between overall performance and birth order using Spearman coefficient did not reveal any influence of experience with triadic interactions on task performance (production: r = 0.08, n = 30, p = 0.70; reception: r = 0.04, n = 30, p = 0.84). Furthermore, no significant correlations could be found for overall performance and daycare visit, (production: r = 0.02, n = 30, p = 0.93; reception: r = 0.20, n = 30, p = 0.29).

3.5.2. Children's performance in noun learning situations

Parallel to the analyses in experiment 1, I conducted a more detailed inspection of the data according to word classes. For nouns children in the production test scored slightly lower in the dyadic than in the triadic condition, scoring 26.7% and 30% of correct answers, respectively. The pattern was reversed for the reception test where the children in the dyadic condition achieved 46.7% in comparison to 43.3% of correct answers scored by the children in the triadic condition (see Figure 18).

Mann-Whitney tests for noun performance showed no significant difference for production in the dyadic vs. the triadic condition: $U = 110$, $p = 0.45$, one-sided. The same holds true for reception $U = 108.5$, $p = 0.43$, one-sided.

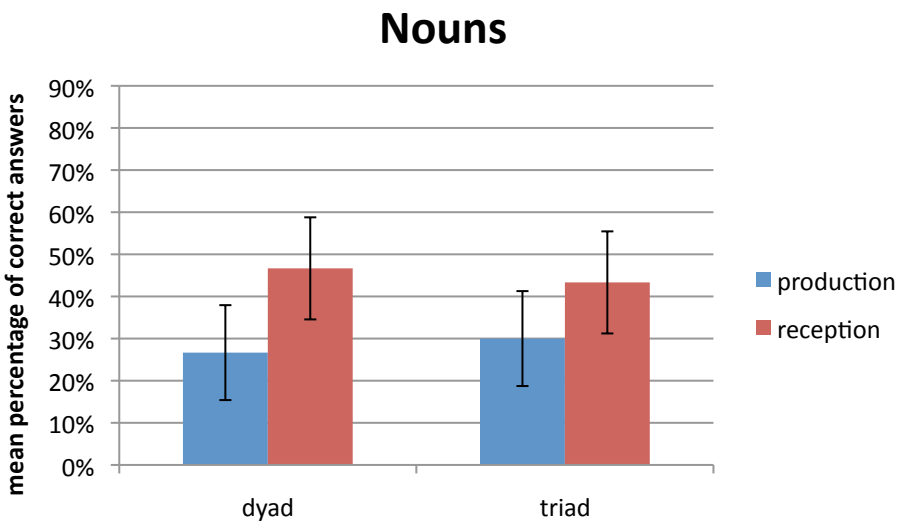


Figure 18: Learning success for nouns in the unfamiliar dyadic and triadic conditions

The children's performance was correlated with their lexical development for all three word classes to test whether children with a relatively extensive lexicon would be more prepared to adapt to the presented unfamiliar linguistic behavior. For nouns, neither production nor reception correlated with the children's lexical development (production: $r = 0.04$, $n = 30$, $p = 0.82$ and reception: $r = -0.05$, $n = 30$, $p = 0.80$)

implying that the size of the children's lexicon did not influence their ability of learning new labels or behavioral patterns.

3.5.3. Children's performance in color adjective learning situations

In the case of color adjectives, one can observe the same pattern than in the case of nouns – only more pronounced: Whereas in the production test, children in the triadic condition scored higher than children in the dyadic condition, achieving 46.7% and 33.3% of correct answers respectively, the pattern was reversed for reception. Here, the children in the dyadic condition scored slightly higher than the children in the dyadic condition attaining 33.3% and 30% of correct answers respectively (see Figure 19).

Mann-Whitney tests for color adjective production and reception displayed no significant differences between both conditions (production: U=96 and p=0.23 one-sided; reception: U = 110 and p = 0.45 one-sided).

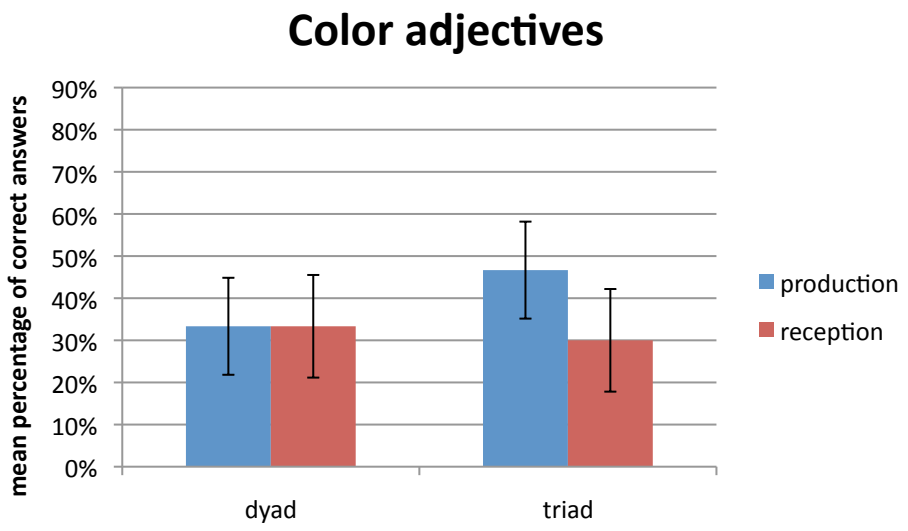


Figure 19: Learning success for color adjectives in the unfamiliar dyadic and triadic conditions

Correlations between color adjective performance and the children's lexical development did not reach significance either for production (r = 0.13, n = 30, p = 0.48) or for reception (r = 0.04, n = 30, p = 0.99) implying once again that the level of the children's lexical development did not influence their task performance.

3.5.4. Children's performance in number word learning situations

The data for number word learning reveal a continuation of the trend observed between the noun and the color adjective data. In the production test the children in the triadic condition again outperform the children in the dyadic condition but this time the difference is much bigger with the children in the triadic condition scoring 66.7% of correct answers in comparison with the children in the dyadic condition attaining only 36% of correct answers. In the reception test again one can observe the reversed pattern with children in the dyadic condition scoring higher than children in the triadic condition attaining 36.6% and 20 % of correct answers respectively (see Figure 20).

A Mann-Whitney test for production revealed a significant effect of the triadic condition (U = 75 and p = 0.04, one-sided) as compared to the dyadic condition, whereas the corresponding test for reception showed no significant differences (U = 91.5 and p = 0.14, one-sided).

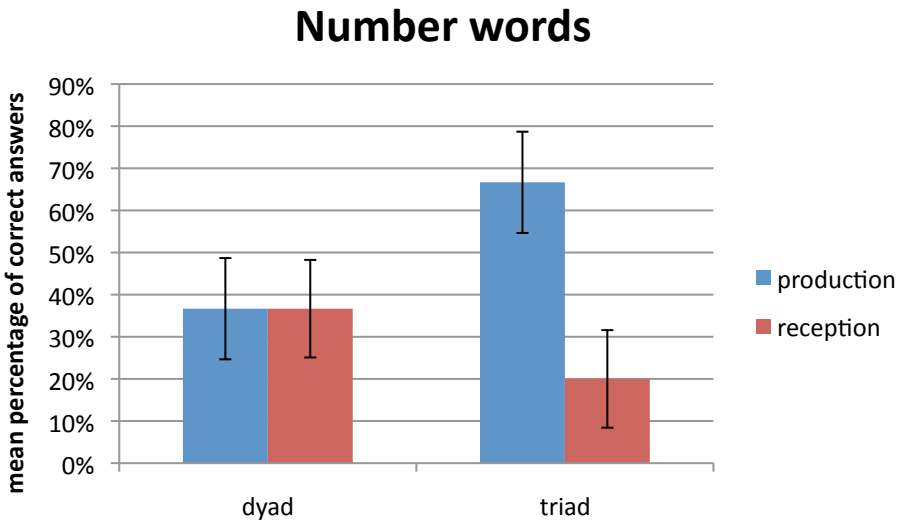


Figure 20: Learning success for number words in the unfamiliar dyadic and triadic conditions

The correlation between number word production and lexical development displayed a bias toward a better learning success in children with a higher lexical development (r = 0.34, n = 30, p = 0.07) implying that children with a more extensive lexicon were more inclined to hazard a try to copy the behavior that had been displayed by the second experimenter during the teaching phase. In contrast, there was no correlation found between number word reception and lexical development (r = 0.20, n = 30, p = 0.28).

In sum, the performance of the children in the dyadic condition seemed to stabilize while the task difficulty increased leveling off at about 33-36% of correct answers for production as well as for reception. The performance of the children in the triadic condition in contrast underwent a change with increasing task difficulty. This change was characterized by an increase of performance in production accompanied by a decrease of performance in reception. This pattern seems to indicate that the children try to participate in the frame imitating the linguistic behavior displayed by experimenter 2, although they are not sure which label to choose. Nevertheless, they participate in the displayed frame, creating a possibility to keep the interaction and thereby the possibility to learn going.

3.6. Discussion

The first hypothesis stated that children in the triadic condition were expected to learn linguistic behavior better because the triadic situation presented them with a model they could imitate, thereby facilitating the task, and that this effect was supposed to augment with task difficulty. The results show that children are able to learn new frames on the fly while learning new linguistic labels for an object or a characteristic of an object like its color or its amount. In most cases the question whether this linguistic label is presented in a dyadic or a triadic teaching situation, however, constitutes no significant difference: Children learn label and frame equally well in both conditions. Therefore, the general hypothesis has to be refuted on the basis of the data for overall performance. However, a more detailed look into the data taking into account task difficulty, i.e. the different word classes comprising nouns, color adjectives and number words, revealed that the advantage of a triadic teaching situation shows only in the number word condition, i.e. in cases in which children cannot bring in their own previously acquired knowledge on comparable teaching situations, but rely only on information encoded in the situation itself. One possible explanation for the better performance in more difficult tasks could be that children in these situations draw on a cognitively simpler mechanism, namely imitation that allows them to solve the task on a shallower level. They may not acquire a better understanding of the labels taught, but they are still able to solve the task by simply copying the successful behavior previously presented by a model. In contrast to the first experiment, the children in the second experiment were faced with an unfamiliar frame, which presented them with a manner of answering that did not correspond to their previously acquired knowledge, namely that a question is usually answered by uttering an answer. Instead, it introduced a novel form of answering, i.e. by placing one's hand on a display. The children understood that they were supposed to produce an answer – which was guaranteed by addressing them with a direct question in the production test – but they also sensed that uttering a word would not be the expected way to do so. After all, only in 2.2% of all cases did the children try to answer to the question by using a word. This means that in the great majority of all cases, the children either refused to answer all together or let themselves in for the new frame

trying to answer in the correct manner predetermined by the model's behavior in the teaching phase. In general, children accepted new frames readily and even tended to create their own frames in the aftermath of the experiment. Often, they initiated naming games by placing their hand on one of the displays asking experimenter 1 to name the pictured element.

The second hypothesis predicted that birth order and daycare visit as operationalizations of the children's experience with triadic interactions would enhance the advantage of the triadic over the dyadic condition. This hypothesis could not be confirmed: the extent of experience with triadic interactions did not influence children's performance in experiment 2 implying that all children can benefit equally from triadic interactions independently from how much experience with this kind of situations they had been able to acquire previously.

As expected, gender and level of shyness had no influence on children's learning success. The latter might be due to the fact that the children in the second experiment did not need to utter a word in order to answer correctly neither in the production nor in the reception test.

In the case of lexical development correlations with reception showed no influence, but production displayed a bias toward a better performance in more difficult tasks, i.e. only in the number word condition. Thus, children with a more extensive lexicon tended to be more inclined to risk an attempt to answer.

4. General Discussion

Experiment 1 compared two-year-olds' word learning success in dyads and triads hypothesizing that children could learn words easier in triadic conditions as the teaching situation offers them a model they can imitate. The results, however, revealed no significant differences between both conditions suggesting that children can learn words equally well in dyadic and triadic conditions. Task-difficulty influenced the children's performance in so far as they produced less correct answers the more difficult the task got. Somewhat unexpectedly, however, there was a significant result for children's color adjective learning in the reception test, which showed that children in the dyadic condition tended to answer better than children in the triadic condition – a finding that could be explained by the children being already familiar with dyadic drawing situations. This, in turn, could be interpreted as a cue that the familiarity of the embedding situation contributes to a better learning success in children. More experience with triadic interactions, that had been hypothesized to enhance children's learning success in triadic learning scenarios, only showed an effect in secondborn children's reception skills whereas the experience gained through day care visit showed no effect implying that only a considerably higher amount of experience with triadic or multi-party interactions does effect two-year-olds ability to learn words through speech not addressed to them. Children's shyness displayed a bias to influence their performance in the production but not in the reception tests – a finding that points to the children experiencing a feeling of inhibition due to the fact that they are expected to produce speech. The level of children's lexical development operationalized through the size of their productive lexicon did not show any correlation to their task performance either in the production or in the reception test – a finding that contradicts the hypothesis brought forward by Floor and Akhtar (2006) who proposed that the vocabulary spurt could be caused by the children's incipient capacity of picking up words from speech not addressed to them. Given that the current study failed to find an effect of triadic teaching on word learning the question arises what role triadic or multi-party interaction plays at the onset of language acquisition on other than the lexical level.

Corresponding to the awakening interest in the role pragmatics plays in language learning (Fogel, 1993a; Tomasello, 1999, 2003), experiment 2 focused on the acquisition of pragmatic frames comparing dyadic and triadic teaching conditions. It was hypothesized that the advantage of the triadic teaching situation would show more clearly in the acquisition of pragmatic skills than in the acquisition of lexical items. Whereas the results for overall performance showed no significant differences between dyadic and triadic learning, a more differentiated view of the results achieved in the different word classes showed that production but not reception in the triadic condition tended to augment, the more difficult the task got. This culminated in a significant advantage of the triadic over the dyadic teaching condition in the most difficult task, i.e. the learning of number words. This suggests that two-year old children benefit most from the modeling taking place in triadic conditions when the frame is unfamiliar and the task difficult to solve. In these cases, the children do not have the possibility of making use of already acquired knowledge. Thus, they depend solely on the information encoded in the teaching situation. It is under these circumstances that they seem to fall back on a simple imitation mechanism that allows them to solve the task and keep the interaction going by simply copying the behavior that had been displayed by the model during the teaching phase. This does not mean that they get a better understanding of the object-label match but it allows them to stay in the situation, thereby prolonging the chance to learn from it. In other cases, in contrast, they learned as much in triadic contexts as they did in dyadic ones. In this sense, the present study contributes to research highlighting the relevance of children's learning from other than dyadic situations placing special attention on the role imitation can play in the acquisition of pragmatics and language learning in general. Children's experience with triadic or multi-party interactions operationalized through birth order and daycare visit had no influence on their task performance, which means that all children are able to profit from triadic teaching independently from how much experience they had previously gathered with comparable situations. The children's level of shyness had no influence on their performance in most tasks, which could be due to the fact that the tasks could be completed without the necessity of uttering speech. This indicates that shy children learn the object-label match and the respective pragmatic frame as well as their peers do. Only in case of number word

production did children with a more extensive lexicon display a bias toward a better task performance, indicating that they were more inclined than their peers to venture a guess to avoid a breakdown of the interaction.

This work has shown that children make use of more than language when they are presented with a verbal teaching situation. They also filter part of the implicitly encoded information on how to use language. Thus, it is not enough to learn a word and its referent: Instead, the word has to be experienced and acquired within its natural context allowing for a representation that includes the object-label match as well as the pragmatic frame it is typically encountered in. Here it is where imitation seems to play a crucial role by enabling the child to copy behaviors typically displayed by other people in certain situations. The child, thereby, shifts from the role of observer to that of an active participant in a given frame, which allows him/her to experience the situation in person – a variation of learning by doing.

5. Bibliography

Akhtar, N. (2005). The robustness of learning through overhearing. *Developmental Science*, *8*(2), 199-209.

Akhtar, N., & Herold, K. (2009). Pragmatic development. In J. B. Benson & M. M. Haith (Eds.), *Language, Memory, and Cognition in Infancy and Early Childhood* (pp. 399-409). Oxford: Elsevier.

Akhtar, N., Jipson, J., & Callanan, M. A. (2001). Learning Words through Overhearing. *Child Development*, *72*(2), 416-430.

Arbib, M. A., Hill, J., & Conklin, J. (1987). *From Schema Theory to Language*. Oxford University Press.

Austin, J. L. (1967). *How to Do Things with Words*. Cambridge, Mass.: Harvard University Press.

Bandura, A. (1971). *Social learning theory*. New York: General Learning Press.

Bandura, A. (1989). Social cognitive theory. In R. Vasta (Ed.), *Six theories of child development*, Annals of child development (pp. 1-60). Greenwich, CT: JAI Press.

Baptista, L. F., & Gaunt, S. L. L. (1997). Social interaction and vocal development in birds. In C. T. Snowdon & M. Hausberger (Eds.), *Social influences on vocal development* (pp. 23-40). Cambridge UK: Cambridge University Press.

Barton, M. E., & Tomasello, Michael. (1991). Joint attention and conversation in mother-infant-sibling triads. *Child Development*, *62*, 517-529.

Bateson, G. (2006). A Theory of Play and Fantasy. In K. Salen & E. Zimmerman (Eds.), *The Game Design Reader: a Rules of Play Anthology* (pp. 314-329). Cambridge, Mass.: MIT Press.

Bertelsmannstiftung. (2010). Ländermonitor Frühkindliche Entwicklung. Retrieved from http://www.laendermonitor.de/grafiken-tabellen/indikator-4a-bildungsbeteiligung-von-kindern-in-

kindertagesbetreuung/indikator/4/indcat/5/indsubcat/1/index.html

Boas, H. C. (2002). Bilingual FrameNet Dictionaries for Machine Translation. In M. González Rodríguez & C. P. Suárez Araujo (Eds.), *Proceedings of the Third International Conference on Language Resources and Evaluation*. Las Palmas.

Brown, E. D., & Farabaugh, S. M. (1997). What birds with complex social relationships can tell us about vocal learning: Vocal sharing in avian groups. In C. T. Snowdon & M. Hausberger (Eds.), *Social influences on vocal development* (pp. 98-127). Cambridge UK: Cambridge University Press.

Bruner, J. (1983). *Child's Talk*. Oxford: Oxford University Press.

Capone, N. C., & McGregor, K. K. (2005). The Effect of Semantic Representation on Toddlers' Word Retrieval. *Journal of Speech, Language, and Hearing Research*, *48*, 1468-1480.

Carey, S. (2010). Beyond Fast Mapping. *Language Learning and Development*, *6*, 184-205.

Carpenter, M., Nagell, K., & Tomasello, M. (1998). *Social cognition, joint attention, and communicative competence from 9 to 15 months of age*, Monographs of the Sociatey for Research in Child Development (Vol. 4, pp. 1-176).

Chavajay, P., & Rogoff, B. (1999). Cultural Variation in Management of Attention by Children and Their Caregivers. *Developmental Psychology*, *35*(4), 1079-1090.

Clancy, P. M. (1986). The acquisition of Japanese. In D. Slobin (Ed.), *The cross-linguistic study of language acquisition* (Vols. 1-2, Vol. 1, pp. 473 - 524).

Collicot, C., Collins, S., & Moore, C. (2009). The development of gaze following in a third-party context. *Infancy*, *14*(3), 363-376.

Correa-Chávez, M., Rogoff, B., & Mejía Arauz, R. (2005). Cultural patterns in attending to two events at once. *Child Development*, *76*(3), 664-678.

Crozier, R. W., & Hostettler, K. (2003). The influence of shyness on children's test performance. *British Journal of Educationla Psychology*, *73*, 317-328.

Csibra, G., & Gergeley, G. (2009). Natural pedagogy. *Trends in Cognitive Science*,

13(4), 148-153.

Doupé, A. J., & Kuhl, P. K. (1999). Birdsong and human speech: common themes and mechanisms. *Annual Review of Neuroscience*, 567-631.

Dunn, J., & Shatz, M. (1989). Becoming a Conversationalist Despite (or Because of) Having an Older Sibling. *Child Development*, *60*(2), 399-410.

Fillmore, C. J. (1968). The case for case. In R. Bach & R. Harms (Eds.), *Universals in Linguistic Theory* (pp. 1-88). New York: Holt Rinehart and Winston.

Fillmore, C. J. (1976). Frame Semantics and the Nature of Language. *Annals of the New York Academy of Sciences*, *280*(1), 20-32.

Floor, P., & Akhtar, N. (2006). Can 18-Month-Old Infants Learn Words by Listening In on Conversations? *Infancy*, *9*(3), 327-339.

Fogel, A. (1993a). *Developing through relationships*. Chicago: University of Chicago Press.

Fogel, A. (1993b). Two principles of communication: Co-regulation and framing. In J. Nadel & L. Camaioni (Eds.), *New perspectives in early communicative development*. London: Routledge.

Fogel, A., Garvey, A., Hsu, H.-C., & West-Stroming, D. (2006). *Change Processes in Relationships: A Relational-Historical Research Approach*. Cambridge: Cambridge University Press.

Forrester, M. A. (1988). Young children's polyadic conversation monitoring skills. *First Language*, *8*(24), 201-226.

Friedmann, N., & Szterman, R. (2006). Syntactic Movement in Orally Trained Children WithHearing Impairment. *Journal of Deaf Studies and Deaf Education*, 56-75, *11*(1).

Gardner, R. A., & Gardner, B. T. (1989). Early signs of language in cross-fostered chimpanzees. *Human Evolution*, *4*(5), 337-365.

Gildea, D., & Jurafsky, D. (2002). Automatic Labeling of Semantic Roles. *Computational Linguistics*, *28*(3), 245-288.

Gliga, T., & Csibra, G. (2009). One-Year_old infants Appreciate the Referential Nature of Deictic Gestures and Words. *Psychological Science*, *20*(3), 347-353.

Goffman, E. (1974). *Frame Analysis: An Essay on the Organization of Experience*. Cambridge, Mass.: Harvard University Press.

Goldberg, A. E. (1995). *Constructions: a construction grammar approach to argument structure*. Chicago: University of Chicago Press.

Grimm, H., & Doil, H. (2006). *Elternfragebögen für die Früherkennung von Risikokindern (ELFRA-2)*. Göttingen: Hogrefe.

Hausberger, M. (1997). Social influences on song acquisiton and sharing in the European starling (Sturnus vulgaris). In C. T. Snowdon & M. Hausberger (Eds.), *Social influences on vocal development* (p. 128156). Cambridge UK: Cambridge University Press.

Heath, S. B. (1983). *Ways with words*. Cambridge: Cambridge University Press.

Lenneberg, E. H. (1967). *Biological Foundations of Language*. New York: Wiley.

Lieven, E. V. M. (1994). Crosslinguistic and crosscultural aspects of language addressed to children. In C. Gallaway & B. J. Richards (Eds.), *Input and Interaction in Language Acquisition* (pp. 56-73). Cambridge University Press.

Locke, J. L., & Snow, C. (1997). Social influences on vocal learning in human and nonhuman primates. In C. T. Snowdon & M. Hausberger (Eds.), *Social influences on vocal development* (pp. 274-292). Cambridge UK: Cambridge University Press.

Mannle, S., & Tomasello, Michael. (1987). Fathers, siblings, and the bridge hypothesis. In K. Nelson & A. van Kleeck (Eds.), Children's language (pp. 23 - 42). Hillsdale, N.J.: Erlbaum.

Marler, P. R. (1970). Birdsong and human speech. Could there be parallels? *American Scientist*, *58*, 669-674.

Martínez-Sussmann, C., Akhtar, N., Diesendruck, G., & Markson, L. (2010). Orienting to third-party conversations. *Journal of Child Language*, *38*, 1-24.

Masataka, N. (2003). *The Onset of Language*. Cambridge: Cambridge University Press.

McCowan, B., & Reiss, D. (1997). Vocal learning in captive bottlenose dolphins: A comparison with humans and nonhuman animals. In C. T. Snowdon & M. Hausberger (Eds.), *Social influences on vocal development* (pp. 178-207). Cambridge UK: Cambridge University Press.

Minsky, M. (1975). A framework for representing knowledge. In P. H. Winston (Ed.), *The Psychology of Computer Vision*. New York: McGraw-Hill.

Nelson, D. A. (1997). Social interaction and sensitive phasees for song learning: A critical review. In C. T. Snowdon & M. Hausberger (Eds.), *Social influences on vocal development* (pp. 7-22). Cambridge UK: Cambridge University Press.

Ninio, A., & Snow, C. E. (1996). *Pragmatic Development*. Boulder, Colo: Westview Press.

Ochs, E. (1986). Variation and error: A sociolinguistic approach to language acquisition. In D. Slobin (Ed.), *The cross-linguistic study of language acquisition* (Vols. 1-2, Vol. 1, pp. 783 - 837). Hillsdale, N.J.: Erlbaum.

Oshima-Takane, Y. (1988). Children learn from speech not addressed to them: the case of personal pronouns. *Journal of Child Language*, *15*(1), 95-108.

Oshima-Takane, Y., Goodz, E., & Derevensky, J. L. (1996). Birth Order Effects on Early Language Development: Do Secondborn Children Learn from Overheard Speech? *Child Development*, *67*(2), 621-634.

Payne, R. B., & Payne, L. L. (1997). Field observations, experimental design, and the time and place of learning bird songs. In C. T. Snowdon & M. Hausberger (Eds.), *Social influences on vocal development* (pp. 57-84). Cambridge UK: Cambridge University Press.

Pepperberg, I. M. (1997). Social influences on the acquisition of human-based codes in parrots and nonhuman primates. In C. T. Snowdon & M. Hausberger (Eds.), *Social influences on vocal development* (pp. 157-177). Cambridge UK: Cambridge University Press.

Pepperberg, I. M. (2002). *The Alex studies: cognitive and communicative abilities of grey parrots*. Cambridge, Mass.: Harvard University Press.

Pepperberg, I. M., & Sherman, D. V. (2000). Proposed Use of Two-Part Interactive Modeling as a Means to Increase Functional Skills in Children With a Variety of Disabilities. *Teaching and Learning in Medicine*, *12*(4), 213-220.

Pepperberg, I. M., & Sherman, D. V. (2002). Use of two-trainer interactive modeling as a potential means to engender social behavior in children with various disabilities. *International Journal of Comparative Psychology*, *15*(2-3), 138-153.

Pye, C. (1986). Quiché Mayan speech to children. *Journal of Child Language*, (13), 85 - 100.

Ross, R. N. (1975). Ellipsis and the Structure of Expectation. *San Jose State Occasional Papers in Linguistics*, *1*, 183-191.

Rumelhart, D. D. (1980). Schemata: The building blocks of cognition. In R. J. Spiro, B. C. Bruce, & W. F. Brewer (Eds.), *Theoretical Issues in Reading Comprehension*. Hillsdale, N.J.: Erlbaum.

Savage-Rumbaugh, E. S. (1991). Language learning in the bonobo: How and why they learn. In N. A. Krasnegor (Ed.), *Biological and behavioral determinants of language development* (pp. 209-233). Hillsdale, N.J.: Erlbaum.

Schank, R. C., & Abelson, R. P. (1977). *Scripts, Plans, Goals, and Understanding: An Inquiry into Human Knowledge Structures*. Hillsdale, N.J.: Erlbaum.

Schieffelin, B. B. (1986). The acquisition of Kaluli. In D. Slobin (Ed.), *The cross-linguistic study of language acquisition* (Vols. 1-2, Vol. 1, pp. 525 -593). Hillsdale, N.J.: Erlbaum.

Schieffelin, B. B., & Ochs, E. (1986). Language Socialization. *Annual Review of Anthropology*, *15*, 163 - 191.

Scollon, R., & Scollon, S. B. K. (1981). *Narrative, Literacy and Face in Interethnic Communication*. Advances in Discourse Processes. Norwood, N.J.: Ablex Publishing Corporation.

Senju, A., & Csibra, G. (2008). Gaze Following in Human Infants Depends on Communicative Signals. *Current Biology*, *18*, 668-671.

Seyfarth, R. M., & Cheney, D. L. (1997). Some general features of vocal development in nonhuman primates. In C. T. Snowdon & M. Hausberger (Eds.), *Social influences on vocal development* (pp. 249-273). Cambridge UK: Cambridge University Press.

Shneidman, L. A., Sootsman Buresh, J., Shimpi, P. M., Knight-Schwarz, J., & Woodward, A. L. (2009). Social Experience, Social Attention and Word Learning in an Overhearing Paradigm. *Language, Learning and Development*, *5*, 266-281.

Snowdon, C. T., Elowson, A. M., & Roush, R. S. (1997). Social influences on vocal development in New World primates. In C. T. Snowdon & M. Hausberger (Eds.), *Social influences on vocal development* (pp. 234-249). Cambridge UK: Cambridge University Press.

Spere, K. A., Evans, M. A., Hendry, C.-A., & Mansell, J. (2009). Langauge skills in shy and non-shy preschoolers and the efects of assessment context. *Journal of Child Language*, *36*, 53-71.

Statistical package for social sciences (SPSS). (2011). . IBM.

Tannen, D. (1979). What's in a frame? In R. Freedle (Ed.), *New Directions in Discourse Processing* (pp. 137-181). Norwood, N.J.: Ablex Publishing Corporation.

Tomasello, Michael. (1999). *The Cultural Origins of Human Cognition*. Cambridge, Mass., London: Harvard University Press.

Tomasello, Michael. (2003). *Constructing a language*. Cambridge, Mass.: Harvard University Press.

Tyack, P. L., & Sayigh, L. S. (1997). Vocal learning in cetaceans. *Social influences on vocal development* (pp. 208-233). Cambridge UK: Cambridge University Press.

van de Weijer, J. (2002). How much does an infant hear in a day? Presented at the GALA 2001 Conference on Language Acquisition.

West, M. J., King, A. P., & Freeberg, T. M. (1997). Building a socail agenda for the study of bird song. In C. T. Snowdon & M. Hausberger (Eds.), *Social influences on vocal development* (pp. 41-56). Cambridge UK: Cambridge University Press.

Xu, F., & Spelke, E. (2000). Large number discrimination in 6-month-old infants. *Cognition*, *74*(1), B1-B11.

Yoshinaga-Itano, C., & Apuzzo, M.-R. L. (1998a). The development of deaf and hard of hearing children identified early through the high-risk registry. *American Annals of the Deaf*, *143*(5), 416-424.

Yoshinaga-Itano, C., & Apuzzo, M.-R. L. (1998b). Identification of hearing loss after age 18 months is not early enough. *American Annals of the Deaf*, *143*(5), 380-387.

6. Appendix

6.1. Questionnaire to be filled in by the parents

Datum: _____

Fragebogen zu Sprache

Vorname des Kindes _____ ☐ weiblich ☐ männlich

Alter in Monaten _____

Geburtsdatum _____

Hat Ihr Kind Geschwister?

☐ ja ☐ nein

Alter: _____

Alter: _____

Adresse:

Name _____

Straße _____

PLZ/Ort _____

Welchen Bildungsabschluss (Schule, Berufsschule, Hochschule, etc.) haben Sie? _____

Wie viele Personen leben in Ihrem Haushalt? _____

Besucht Ihr Kind eine Kindertageseinrichtung? ☐ ja ☐ nein Seit:_____

Geht Ihr Kind zu einer Tagesmutter? ☐ ja ☐ nein Seit:_____

Wenn ja: wie viele weitere Kinder betreut die Tagesmutter?_____

Bitte kreisen sie ein welche Wörter Ihr Kind versteht (👂) und welche es schon versteht und selbst spricht (👄):

Handlungen			**Relationen zwischen Objekten**			**Substantive**		
legen	👂	👄	beige	👂	👄	Legostein / Duplostein	👂	👄
geben	👂	👄	neben	👂	👄			
weg	👂	👄	hinter	👂	👄	Klotz	👂	👄
hoch	👂	👄	vor	👂	👄	Knopf	👂	👄
runter	👂	👄	über	👂	👄	Murmel	👂	👄
Farbwörter			auf	👂	👄	Stift	👂	👄
blau	👂	👄	unter	👂	👄	Brosche	👂	👄
rot	👂	👄	in	👂	👄	Ohrring	👂	👄
gelb	👂	👄	**Zahlwörter**			Kiste	👂	👄
grau	👂	👄	vier	👂	👄	Gürtelschnalle	👂	👄
lila	👂	👄	zwölf	👂	👄			
orange	👂	👄	hundert	👂	👄			

Kombiniert Ihr Kind schon zwei Wörter miteinander? (z.B. *Papa Arbeit!*), wenn ja, fallen Ihnen Beispiele dazu ein?

Wie schüchtern ist Ihr Kind?

Gar nicht schüchtern ☐ ☐ ☐ ☐ ☐ ☐ Sehr schüchtern

Dankeschön!

6.2. Declaration

Erklärung

Hiermit erkläre ich, dass ich die vorliegende Arbeit selbstständig verfasst, keine anderen als die angegebenen Hilfsmittel verwendet und wörtlich oder inhaltlich übernommene Stellen als solche gekennzeichnet habe.

Diese Dissertation ist auf alterungsbeständigem Papier nach DIN-ISO 9706 gedruckt.

Juana Salas Poblete

Bielefeld, Juli 2011