"Well you can't put your swimsuit on on top of your pants!":
Child-mother uses of *in* and *on* in spontaneous conversation[1]

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1.   Introduction

This paper presents a range of uses of *in* and *on* produced and heard by English acquiring children. It shows that uses of the terms extend beyond the concepts of containment and support primarily examined in empirical studies and discussed in the literature. The paper presents evidence that a prevalent use of *in* and *on* by both mothers and children is not as a preposition in a prepositional phrase, but as a verb particle. Further, while uses are predominantly spatial, they may also be temporal or relational.

2.   Background

Several researchers have looked at different languages and the typological considerations which affect the way children use spatial terms. Papers throughout this volume point to crucial differences between ways of talking about space cross-linguistically and spatial term acquisition in languages such as Dutch, English, Hebrew, Inuktitut, Korean, Tzeltal, Turkish and Zapotec, among others. However, there has been little detailed investigation into the range of variations of use within a language. It seems, then, that a useful approach might be to focus on a single language and to examine some everyday interactions between children and adults in order to get a sense of the range of uses of *in* and *on* both heard and produced by children.

Spatial terms have been found to be among English-acquiring children's earliest grammatical morphemes. At around the age of two years children begin to produce *in* and *on* (Brown 1973). The acquisition of these terms by young English speakers has been examined in several studies, focussing both on comprehension (Clark 1973, Grieve, Hoogenraad, and Murray 1977) and on production (Brown 1973, Choi and Bowerman 1991, Johnson and Slobin 1979). Researchers have found that comprehension precedes production and that acquisition order of *in* and *on* is fairly consistent. The words commonly appear in young children's talk at around the same time, while a third spatial term, *under*, follows sometimes up to 6 months later.

Children have been found to rely quite heavily on non-linguistic spatial cues in their acquisition of these terms. Further, they know that canonically objects go IN containers and ON surfaces, so toy animals go IN cribs rather than UNDER them, and trains are likely to go ON tracks rather than the other way around (Clark 1973, Wilcox and Palermo 1974). The reliance on non-linguistic cues has pointed to evidence that children have underlying concepts of spatial distinctions which are later mapped to the appropriate word for the concept. However, knowing the canonical configurations of objects and being aware of which objects are typically Figures and which are Grounds usually does not mean that a child will have an

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adult-like use. Use of *in* and *on* in spatial relations can be idiosyncratic, and beyond this, the terms are often used in non-spatial constructions.

Studies of the acquisition of *in* and *on* in English generally take a similar view of what the function of these words is and how these terms are used. Although some studies have discussed the use of these terms as verb particles (Goodluck 1985, Hallan 2001, Tomasello 1987) the majority of acquisition studies examine uses of *in* and *on* as spatial prepositions. Much of the information about children's acquisition of *in* and *on* comes from experimental or laboratory research rather than from recordings of unstructured entirely spontaneous speech. When *in* and *on* are tested in empirical studies, they are generally examined as spatial terms, such as *Put the block in the box* and as prepositions at the head of prepositional phrases, such as *Put the baby in the bath.*

Typically in studies of *in* and *on* the property most commonly associated with *in* is *containment*. Although this description is widely used in the literature it only describes some instances of use of *in*. Containment uses of *in* are those where a Figure is considered to be within a Ground but not part of the Ground. For example: *the water in the vase; the flowers in the vase; the birds in the tree*. The central concept of spatial uses of *in* may also involve notions of inclusion, for example: *the boy in my class*. The use of *on* usually involves the concept of *support*. Support occurs when the weight of a Figure is perceived to press or pull upon a Ground. For example: *the book on the table, the shirt on the hook, the fly on the ceiling*. The central concept may also involve contiguity, where there is contact between a Figure and a boundary or a point on the Ground surface. For example: *the reflection on the water; the runner on the line*.

There is an implicit assumption in the literature that these spatial prepositional uses of *in* and *on* are the primary uses and children's ability to use *in* and *on* as prepositions indicates acquisition of the terms. However, there is no evidence that spatial prepositional uses are the earliest or the most frequent uses of these terms. In fact, there is some evidence that verb particle uses of *in* and *on* may be learned prior to the acquisition of prepositional uses (Hallan 2001, Tomasello 1987). While empirical studies provide an excellent framework for an examination of children's use of *in* and *on* across a variety of comparable instances, they do not capture the range of uses that the child hears and produces. In order to capture a fuller account of young children's exposure to *in* and *on*, and the range of uses children employ, it is necessary to examine everyday conversations between children and their primary caregivers.

3.   Method
3.1   Subjects
Data for the current study comes from the Wells (1981) corpus in the CHILDES (MacWhinney 1991) database. It consists of recordings of ten children (7 girls, 3 boys) interacting in their homes with their mothers. The children were followed longitudinally over a 32 month period between the ages of approximately 1;6 to 4;8.

3.2   Data coding

All uses of *in* and *on* throughout the study were coded. In the initial coding for all uses of *under* were also coded. Uses of *in, on,* and *under* across the ten mothers and children were as follows:

	IN	ON	UNDER
MOTHER	569	790 (529)	6
CHILD	363	411	2

Table 1   *Overall mother-child uses of 'in', 'on', and 'under'*

Table 1 indicates that from a total of 225, 627 words in the corpus there were only 2 child uses of *under* and 6 adult uses. While this finding has interesting implications for research regarding the acquisition of *under* as a later-learned preposition (see Rohlfing 2002 for an in-depth discussion) an examination of *under* in this study was not feasible. The remainder of the study therefore focuses on the different uses of *in* and *on*.

Grammatical structure

Data was coded according to grammatical category and divided into prepositional and phrasal verb or verb particle uses. Prepositional uses are those where *in* or *on* occurs with a following noun phrase and functions as the head of a prepositional phrase. For example, *She wants to go on the bus*. Phrasal verb, or verb particle uses are those where *in* or *on* occurs as a grammatical part of the verb and as part of the verb phrase. For example, *She wants to go on with her story*. Several syntactic tests were used to distinguish prepositions from particles, including *particle movement, cleft construction, fronting* and *substitution* (Bolinger 1971, Radford 1988)[2].

Types of uses

Prepositional uses were further coded according to the meaning of each use. The meaning categories were spatial, temporal, and relational (this is a catch-all term for non-spatial and temporal uses in a PP). Phrasal verb uses were further coded according to whether the verb particle occurred in a position adjacent to the verb or whether it occurred in a split periphrastic use where the verb and particle are separated by an object noun phrase. For example:

STRUCTURE	**IN**	**ON**
preposition	The blanket got *in* the wet	She put it *on* me
particle	Then *come in* in the evening	*Come on* in
split	Put the shoe on *in* you[r] bedroom	No you got to keep it *on*

TYPE OF USE		
spatial	He lived *in* a shoe	Go *on* the donkeys?
temporal	I'm gonna have a nanal *in* a minute	She went to London *on* Saturday
relational	You'll be *in* trouble with Georgie	She went *on* a trip

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[2] O'Dowd (1999) has shown that these syntactic tests may yield different results for the same usage. However, for the purposes of this research the tests were useful in distinguishing preposition from phrasal verb status.

Prototypical vs. Non-prototypical
Uses of *in* and *on* that were spatial prepositions at the head of prepositional phrases were coded as being *prototypical*. Uses that were non-spatial or non-prepositional were considered *non-prototypical*. The judgement of prototypicality here is based on the types of uses most frequently discussed and examined in the literature. Some previous research has noted distinctions between phrasal verb and spatial preposition uses. However, uses of *in* and *on* do not always fit within the distinction between spatial preposition and particle use. It is important to examine the function of the preposition if we are to capture the range of uses of the terms. For this reason, prototypical spatial preposition uses have been coded separately from all other uses of *in* and *on*.

4   Results
Results indicate that both mothers and children use *in* and *on* in a variety of ways that extend beyond prototypical spatial preposition uses prominent in the literature. While all mothers and children used *in* and *on* as spatial prepositions, they also regularly used the terms as temporal and relational prepositions and as phrasal verbs.

4.1   Initial child uses
Children's use of *in* and *on* was recorded over a long time frame and many linguistic milestones were reached by the children throughout the duration of the corpus. While this study is limited to examining these uses across the corpus as a whole as opposed to marking individual linguistic development across time, children's initial uses of the two terms were recorded. The primary initial use of *in* was as a prototypical spatial term. For 7 children this was the initial use while 3 children used *in* as a phrasal verb. The age of initial use of *in* varied widely across children, ranging from 1;5;26-2;8;30. Initial uses of *on* differed from those of *in*. For 4 of the children their initial recorded use was prototypical while 6 children's initial use was as a non-prototypical phrasal verb. The age of initial use ranged from 1;3;3-2;6;1. Overall, children's initial use of *on* occurred at an earlier recording time than the initial use of *in*. Although there were initial use differences across the children, every child and mother used *in* and *on* in each of the use types coded in §3.2. These results are presented in the following sections.

4.2   Mother's use of IN
Mothers used *in* prototypically as a preposition at the head of a prepositional phrase and non-prototypically as a non-spatial preposition or as a phrasal verb in both adjacent and split periphrastic uses. Figure 1 below indicates the mean number of uses of *in* by individual mothers across the corpus.

As can be seen in Figure 1 there was considerable variation across the mothers in their prototypical and non-prototypical use of *in*. For six of the mothers (Iris, Hari, Geof, Fran, Deb, Dar) the primary use of *in* was prototypical. One mother had equal prototypical and non-prototypical uses (Elle), and for the remaining three mothers (Abi, Ben, Elsi) the primary use of *in* was non-prototypical. Figure 1 shows mean uses of *in* by each mother across each of the ten recording times.
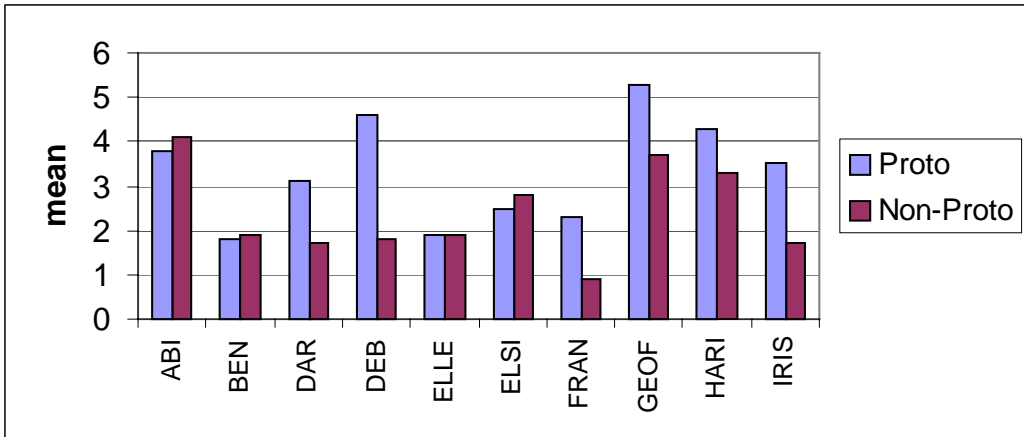
Figure 1.   *Mothers' use of 'in'*

The mean number of prototypical uses of *in* across all of the mothers across each of the ten files totaled 33.1 and included types of uses such as:

i.   *Put it back in the cupboard now*
ii.   *You can't stay in your pajamas all day love!*

The mean number of non-prototypical uses across the mothers was lower than the prototypical uses and totaled 23.8. It included uses such as:

i.   *You will be staying in to school dinners*
ii.   *Let me tuck your jumper in*
iii.   *You'll hurt yourself again in a minute*

4.2   Children's use of IN
Children used *in* as a preposition in spatial, temporal and relational contexts. They also used *in* as a verb particle in a phrasal verb in both adjacent and split periphrastic uses. Figure 2 shows mean uses of *in* by each child across each of the ten recording times.
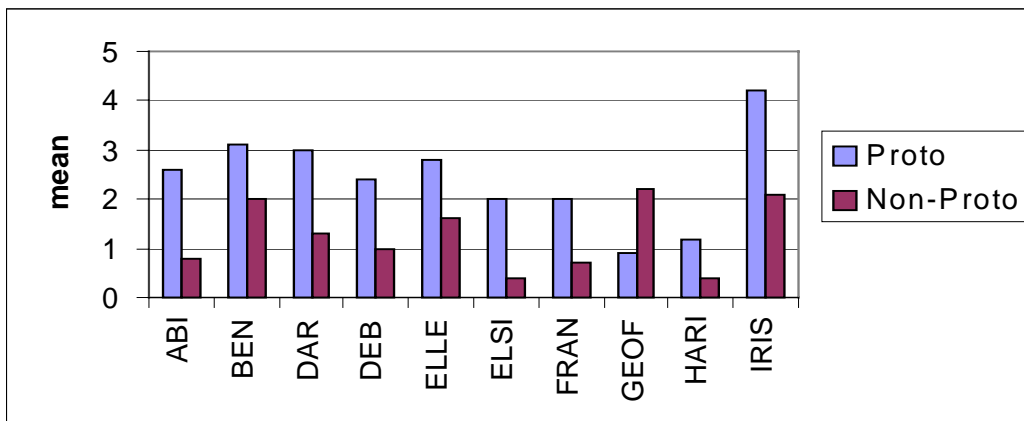

Figure 2.   *Children's use of 'in'*

Figure 2 above, indicates that as with the mothers' use of *in*, children used *in* both in prototypically and non-prototypically. For all of the children except Geo the primary use of *in* was prototypical. The mean number of prototypical uses across all of the children totaled 24.2 and included types of uses such as:

i.   *And I've got the money in my pocket*
ii.   *He went sick in there, didn't her?*

The mean number of non-prototypical uses across the children were very close in number to the prototypical, with 23.8. These uses included:

i.   *Hong Kong Fooey in a minute.*
ii.   *It will go in if Mummy does it.*
iii.   *Put more tights in.*

4.3   Mothers' use of ON

Mothers used *on* in each of the grammatical structures coded (preposition phrases and phrasal verbs) and across the different types of uses (spatial, temporal, relational). One systematic use of use of *on* across each of the mothers was in the frozen phrase *come on*. Of the 790 uses by mothers across the corpus, 269 (34%) were in this phrase. 'Come on' was rarely used by children and its use pointed to an imbalance in the potential uses of *on* by adults and children. Adults used the phrase when they were encouraging, comforting, or berating a child. Children do not have the same opportunities for this behavior and therefore do not often have the opportunity to use this phrase. The few uses that were recorded involved children playing with a doll, a dog, and a younger sibling. Counting its use as part of the set of uses of *on* skews the data. Uses were therefore omitted, resulting in 521 uses of *on* by mothers overall. Figure 3 below indicates the mean number of uses of *on* by individual mothers across the ten recording times in the corpus.
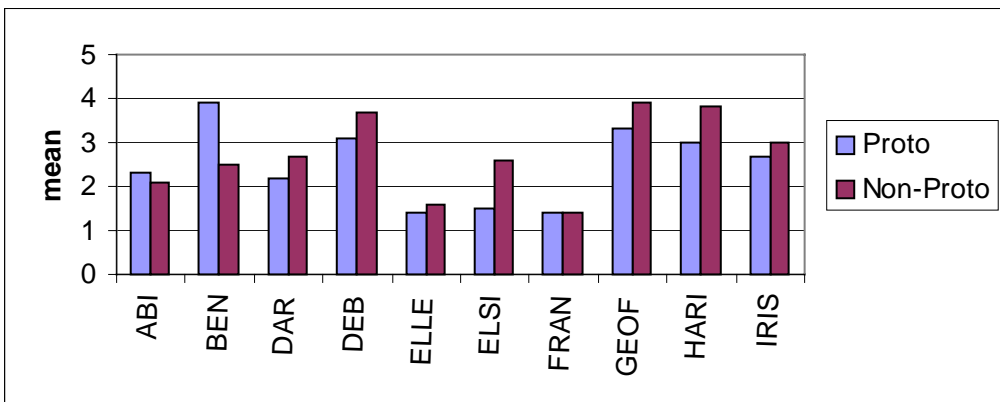

Figure 3.   *Mothers' use of 'on'.*

Figure 3 indicates prototypical and non-prototypical use of *on*. There was considerable variation in uses across the mothers. For seven of the ten mothers (Dar, Deb, Elle, Elsi, Geof,

Hari, Iris) the primary use of *on* was non-prototypical. One mother (Fran) had equal prototypical and non-prototypical uses of *on* and the remaining two mothers (Abi, Ben) show more prototypical uses of *on* than non-prototypical. The mean number of prototypical uses across the mothers totaled 24.8 and included types of uses such as:

i.   *We're going up on a bus tomorrow.*
ii.   *That's the largest ladder on the board.*

The mean number of non-prototypical uses of *on* across the mothers totaled 27.3. This was slightly higher than the prototypical uses. These non-prototypical uses included:

i.   *You're going to be three on Friday.*
ii.   *Please put your clothes back on.*
iii.   *You can't carry on crying all day.*

4.4   Children's use of ON
As with uses of *in*, children used *on* in similar ways to the uses reported for the mothers. Figure 4 shows mean uses of *on* by each child across each of the ten recording times.
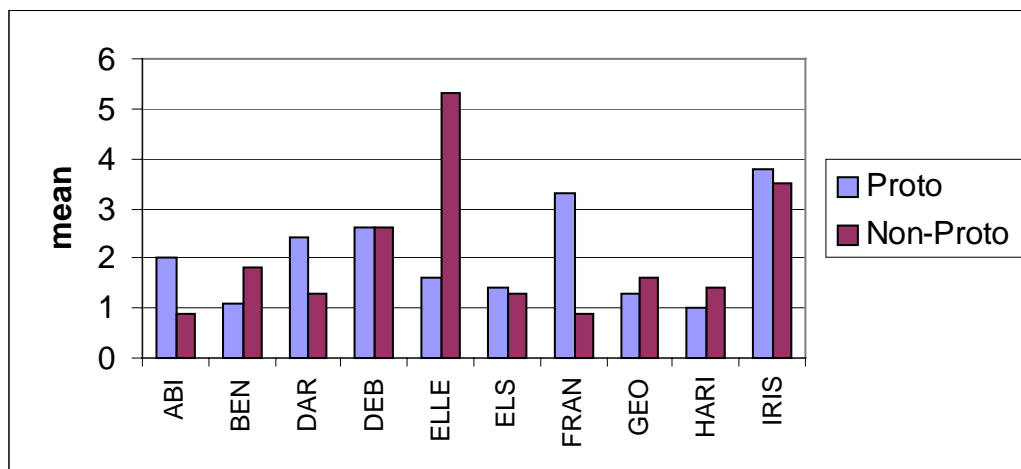

Figure 4.   *Children's use of 'on'.*

Figure 4 above indicates that children used *on* in prototypical and non-prototypical ways. For six of the children (Abi, Dar, Deb, Els, Fran, Hari, Iris) the primary use of *on* was prototypical. For the remaining four children (Ben, Elle, Geof, Hari) the primary use of *on* was non-prototypical. The mean number of prototypical uses across the children totaled 20.5 and included types of uses such as:

i.   *We are going on a tractor.*
ii.   *Do they like me treading on them?*

The mean number of non-prototypical uses of *on* across the mothers was almost equal to the number of prototypical uses and totaled 20.6. These uses included the following:

i. *I'm going to see London on Tuesday.*
ii. *Mummy! I put my shoes on.*
iii. *Can I put on the television?*

4.5   Further non-prototypical uses

The range of uses of *in* and *on* that were coded as being non-prototypical are presented in the following sections. Several uses were employed only by mothers in the study. Uses that were employed by children were in every case also employed by mothers, so in each "Child and Mother" use the child's mother also used the term in the same way. Throughout the corpus there were no instances in which a child employed a non-prototypical use that was not also used by their mother in a preceding or in the same recording session.

4.5.1   Uses of IN

Non-prototypical uses of *in* included prepositional uses where the noun referred to something temporal, such as *in a minute*, or a state of being, such as *in a bad mood*. These included fixed expressions, such as *in order to*. A more extensive set of uses is given below:

Mother only	in season	color in
	in case	lock in
	in favour	sit in (to stage one)
	in fashion	kept in (at school)
	in character	in a bad mood
	in a temper/mess/muddle	in order to
	in darkness/sickness/grief/panic	
	in a moment/second/minute/year	
Child and Mother	get in	come in
	go in	put in
	color in	in a hurry

4.5.2   Uses of ON

Temporal prepositional uses, such as *on Friday* were also found in non-prototypical uses of *on*. Uses also included a state of being, such as *on the way home*. Several non-prototypical uses also occurred in frozen phrases, such as *in order to*. Phrasal verb uses also included fixed expressions such as *carry on*, meaning 'to continue'. Further uses are presented below:

Mother only	later on	go on at
	look on	not on (not allowable)
	work on	turn on (excite)
	kept on (continued)	on tape
	carry on	on time
	continue on	on the way home
	right on	on the left
Child and Mother	get on	come on
	put on	go on
	have on	on holiday

4.6 Discussion and Conclusions

Results indicate that each of the children employed *in* and *on* across the range of different uses employed by the mothers. The children differed according to whether initial uses were prototypical or non-prototypical. Across the recording times, use of *in* was predominantly as a spatial preposition for 9 of the 10 children, while use of *on* was most frequently used as a spatial preposition for 6 of the 10 children.

In this study the results of the child uses are grouped together across the recording times which means that individual child uses are not captured over specific discrete time points. While the use of *in* and *on* changed over time, as evidenced by the fact that initial uses were not the only uses each child employed, for all but one child relational and temporal uses of the terms did not emerge until after the spatial uses. Children across the study did not use *in* and *on* in the same way - from the beginning there was diversity of use. The variety of uses suggest that children are not basing their uses on a mapping of the words to an existing concept. If children use these terms with a bias toward spatial uses due to an already existing concept, then it would be expected that across all subjects their initial uses of the terms would be a mapping to the relevant concept. However, this is not the case. The evidence does not point to a direct mapping from a spatial concept to a spatial term. Nor is it clear that children's spatial semantic categories originate in non-linguistic development.

Knowing the canonical configurations of objects and being aware of the properties usually afforded a Figure and Ground does not mean that a child will be able to have an adult-like use. This is further evidenced by an examination of errors or non-conventional uses. Throughout the study there were 4 instances of a non-conventional use of *in* and no non-conventional uses of *on*. Non-conventional uses of *in* included:

i.   *See in the television*
ii.   *Shall I go in the road?*

Prior to each of these non-conventional uses of *in* the child had employed a conventional use of the term and the non-conventional use is a later-introduced secondary use. These uses are misuses that appear to be a result of the child trying to deal with the idiosyncrasies of English spatial configurations. The prototypical meaning of *on* is support and the usual configuration of X being *on* Y is that X supports Y. If the child in (i) sees pictures on television as occurring within the frame of the television then this use makes sense. It is only through the alternative input of use of *on* that the child will come to learn which preposition to use. The same can be said of (ii) where there is a problem with what constitutes a bounded entity. The errors are driven by the children choosing a plausible but non-adult-like spatial term to mark an idiosyncratic spatial relation. These types of errors indicate that it is not enough for a child to know the properties of a Figure and Ground.

The rationale for splitting the mother-child uses into prototypical and non-prototypical categories is to show that for both adults and children these terms have much broader uses than hitherto examined in the literature. Further, the uses differ within the particular syntactic categories of phrasal verb and preposition. This highlights one of the problems with examining children's early speech with relation to syntactic definitions. There is a risk of losing

information regarding lexical specificity when different lexical items are counted as instances of the same category (Pine and Martindale 1996).

Throughout this study both mothers and children used *in* and *on* in several ways that extend beyond prototypical spatial preposition uses. Adults had a higher percentage of non-prototypical uses than children. However children used *in* and *on* in each of the grammatical categories (prepositions and phrasal verbs) and in all of the functions (spatial, temporal, relational). Children employ these terms in the types of uses they hear in the input language. We can see when we look at children's spontaneous conversations that rather than a mapping from an *a priori* concept to a target word, they are using the terms in very similar ways to those we see in the conversations of adult English speakers.

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