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Pragmatic directions and children's word learning*

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ABSTRACT

The present study tested the hypothesis that children as young as two use what adults tell them about meaning relations when they make inferences about new words. 18 two-year-olds (mean age 2;2) and 18 three-year-olds (mean age 3;2) learned two new terms (a) with instructions either (i) to treat one term as a superordinate to the other, or (ii) to replace one term with another; and (b) with no instruction given about how two new words might be related. Children were attentive to both kinds of instructions or pragmatic directions, and made use of them in their word-learning. When they received no instruction relating the two new words, they resorted to a range of coping strategies to assign and relate meanings to each other. These findings support the view that children's learning of new word meanings is guided by the pragmatic directions adults offer.

INTRODUCTION

One major task facing children as they acquire a first language is learning new words and their meanings. In word-learning tasks, children appear to rely on a small set of strategies, as inferred from their choices of referents. These strategies have been identified as potential constraints on early word-learning, constraints children observe so as to simplify the formidable task of assigning meanings to a large number of new words, with minimal exposure,

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in a short time (e.g. Markman, 1987, 1989; Merriman & Bowman, 1989; Golinkoff, Hirsh-Pasek, Bailey & Wenger, 1992). One typical finding is that children fail to learn a second term for a referent that has already been labelled with a first one (either familiar or new) (e.g. Merriman, 1986; Markman & Wachtel, 1988). This has suggested that children initially allow each term to pick out just one referent-type: a dog can be referred to as *the dog*, but not also as *the animal* or *the poodle*. Other studies, however, have found that two- and three-year-olds can in fact use two (or more) terms for the same referent, in both spontaneous and elicited speech. For example, a bowl may be both *bowl*, when the child is eating from it and *hat*, when it's placed upside down on the child's head (e.g. Clark, 1997; see also Waxman & Hatch, 1992; Waxman & Senghas, 1992; Clark & Svaib, 1997; Deák & Maratsos, 1997). The fact that young children can do this suggests there must be a reason why they fail to make the kinds of inferences in some word-learning studies that they can make elsewhere.

What might account for the difference? One explanation might lie in the information adult speakers offer about how word meanings are related. When adults introduce new words to young children, they use a range of instructions about them. They introduce subordinate terms for subcategories with *kind of*; they note where one thing *looks like*, *sounds like*, or *is shaped like* another; they identify one thing as *part of* another (e.g. Blewitt, 1983; Shipley, Kuhn & Madden, 1983; Callanan, 1985, 1989; Masur, 1997). In short, they offer explicit links among word meanings in the form of what we will call PRAGMATIC DIRECTIONS. These directions provide children with additional information about the speaker's intended meaning, especially with respect to unfamiliar words. In the present study, we focus on some pragmatic directions that indicate how two word meanings are related.

If children rely on such pragmatic directions, then they should have difficulty when such directions are missing, particularly when they are trying to grasp new words. Imagine a child just learning the terms for different musical instruments. She is first shown an oboe and told 'This is a reed.' Then she is shown a clarinet, 'This is a clarinet,' and given the further direction: 'It's another kind of reed.' From this, the child now knows that *reed* is a superordinate that can be used for both clarinets and oboes (note that she had learnt the term *reed* first for oboes). So she should feel confident in picking out a clarinet as well as an oboe when asked for *a reed*. She should also be aware that clarinets can be referred to both as *reeds* and as *clarinets*. With different pragmatic directions, the same child might make quite different inferences. Again, imagine a child who is shown an oboe and told 'This is a clarinet.' But the next minute, the speaker corrects himself, saying 'Oh, I was wrong. That's not a clarinet; it's an oboe.' What should the child infer about the two words just introduced? She knows that *clarinet* is different from *oboe*, and she also knows that *clarinet* is not superordinate to *oboe*, and she knows

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that *oboe* designates a particular type of instrument, but she doesn't yet know what type of instrument *clarinet* designates. In each case, the adult speaker has offered pragmatic directions about the new words, and the relation between them. In the first, the direction specified that *reed* was superordinate to *clarinet*; in the second, *clarinet* was dropped (to be ignored for current purposes) in favour of *oboe*.

Now consider what happens when the child receives no pragmatic directions. Introduced to some musical instruments, she is simply told 'This is a clarinet' for clarinets, and 'This is an oboe' for oboes. Now, without further information, the child cannot legitimately make any further inferences about possible relations between the meanings of *clarinet* and *oboe*: is one superordinate to the other? Do they refer to types as similar as subkinds of cats (e.g. Siamese vs. Burmese), or as different as different animal kinds (e.g. lynx vs. squirrel)? Or do they refer to distinct domains (e.g. boy vs. gymnast)? The child simply cannot tell without adequate pragmatic directions. She can, of course, draw on what she can see and hear of the similarity of the two instruments to any other instruments she knows about, to apply some COPING STRATEGY in the event that she is asked to make further inferences about the words.

Could the discrepancy between the word-learning results and children's spontaneous usage of two terms for the same object depend on what pragmatic directions are available? The hypothesis we tested is that whenever such directions are available, children make use of them. But if they receive no directions, they must fall back on one or other coping strategy. We predicted that the same children would treat newly taught words differently, depending on whether they received pragmatic directions or not, and on what those directions were. To test this, we asked the same children to learn two new words in each of three conditions: (a) with pragmatic directions about an INCLUSION relation of the *reed/clarinet* type; (b) with pragmatic directions in the form of an overt REPAIR, of the *clarinet* > *oboe* type, where a first word is replaced by a second one; and (c) without any pragmatic direction about how to relate the two words, as when the relation between *clarinet* and *oboe* was UNSPECIFIED. In the inclusion condition, with a pragmatic direction ('A clarinet is a kind of reed'), children should treat one word (*reed*) as picking out both clarinets and oboes, say, and the other (*clarinet*) as picking out only clarinets. In the repair condition, also with a pragmatic direction (after the learning of *clarinet*, a repair from the adult: 'Oops, I made a mistake – it's an oboe'), children should give referents only for the second word (*oboe*). And when there is no pragmatic direction, children could opt for a range of possibilities, but a major choice would probably be use of one of the two words (e.g. *clarinet*) just for clarinets, and the other (*oboe*) just for oboes.

At what stage should children be able to make use of pragmatic directions? Adults offer them in their conversations with children from the first, and

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two-year-olds can use two terms for the same referent, but most word-learning studies have focused on three- and four-year-olds. To find out how responsive children were to pragmatic directions in word-learning, we decided to focus on two- and three-year-olds.

METHOD

Subjects

The subjects were 36 nursery school children, 19 boys and 17 girls, divided into two age groups: 18 two-year-olds, aged 2;0–2;6 (mean 2;2), and 18 three-year-olds, aged 2;10–3;6 (mean 3;2). Roughly half the children at each age were girls, and half boys. All but three of the children were learning English as their first language. The other three, who were growing up bilingually, were indistinguishable from the monolinguals in their responses.

Materials

The materials consisted of six sets of 5 items each, grouped as three pairs of sets: (i) five honey sticks and five small wire whisks, all about 8 cm long, with objects from both sets being of similar size and shape; (ii) five badminton shuttlecocks and five plastic cups, each about 8–9 cm high, again all of similar size and shape; (iii) five tea-holders with spoon-like tong-handles about 8 cm long, and five tea-holders with very short (2 cm) handles, with the tea-compartment in both sets being of the same size and shape. As each set of objects was introduced and talked about, the experimenter (J.B.G.) demonstrated what it could be used for: the honey sticks and the whisks were both used to stir water in a bowl; the shuttlecocks and the cups (both inverted) were used to conceal short pieces of pipe; and the two types of tea-holders were used to scoop up dried beans. The materials also included one further set of five thick, bendable, rubber-covered pieces of wire, 7 cm long and 1 cm in diameter – these were mixed up with the target objects during the test phase to make sure the children had been attending to the target items. (Although the same distracter set was used in the test phase of all three conditions, children never played with these items during the learning phases, so they were likely to remain less familiar overall than any of the target set items, and hence potentially attractive as choices in the test phases.) Materials also included the various props needed for demonstrating the relevant actions for each set of objects: 4 cm pipe-segments, dried beans, a 12 cm diameter bowl of water.

The words E (the experimenter) taught consisted of CVC nonsense words chosen for ready pronounceability from the low association lists in Hilgard (1951). In each condition, children were exposed to two nonsense words, assigned to object-set pairs as follows: sticks and whisks (*gok*, *jad*); shuttles

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and cups (*ruk*, *dob*); and long- vs. short-handled tea-holders (*dax*, *keb*). The nonsense words were counterbalanced across children in their assignments within each pair of object sets.

The assignment of object sets (i), (ii), and (iii) to conditions (inclusion, unspecified, and repair) was counterbalanced in a Latin Square design across children within each age group. The order of the three conditions was also counterbalanced with a Latin Square across children within ages.

Each session was recorded (on a Sony TC-55 cassette tape-recorder) to check that E used each novel term at least 12 times in each learning session. (A check of the first third of all sessions showed that E produced between 12 and 20 uses per session for each word taught.) The tape of each session also recorded any comments children made, as well as any spontaneous uses they made of the terms being taught.

Conditions

Each child took part in all three conditions, with each consisting of a learning phase for each of the two new words in turn, followed by a test phase consisting of eight questions (four per word) to assess what the child had just learnt. We will use A for the first word taught and B for the second; Set 1 for the objects designated by A, and Set 2 for those designated by B. In the UNSPECIFIED CONDITION, children were taught two new words, A and B, but E offered no specification of any meaning relation between A and B. In the INCLUSION CONDITION, children were taught two new words, and given explicit information about how the meaning of the second, B, was linked to the first, A, through E's one use of an inclusion statement ('a B is a kind of A' or 'Bs are a kind of A'), as he moved from the first to the second learning phase. In the REPAIR CONDITION, children were again taught two new words, but E introduced the second with an explicit repair offered just once at the end of the first learning phase (for A), with the introduction of B ('Oops, I made a mistake: that's a B, not an A'). The repair condition differed in one respect from the other two since E focused on the same target set (set-1) for both learning phases.

Procedure

The procedure, for each of the three conditions, consisted of a two-part learning phase, followed by a test phase. Each child participated separately, in a small experimental room near the nursery school classrooms. For a child who received the three conditions in the order unspecified, inclusion, and repair, for example, E began by introducing a first set of unfamiliar objects, for example, five shuttlecocks. He would place them on the table and say 'These are ruks. Have you ever played with ruks before?' Then he demonstrated a possible action to be performed with the ruks, encouraging the child to follow suit.

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As the child carried out the suggested action, E gave a running commentary in order to provide naturalistic exposure to repeated instances of the novel term (e.g. 'Oh good, you put all the ruks on top of the pipes. I like to play with ruks, don't you? D'you want this ruk?', etc.). After the child had heard the first set of unfamiliar objects labelled in this way at least 12 times, E set the first objects aside, and introduced a second set of unfamiliar objects, five collapsable plastic cups. E then showed the child how the cups (all in opened position) could be used for the same action as the first set of objects, covering up segments of pipe, and offered a new term ('dob') for these objects, again at least 12 times.[1]

Once the child had heard enough instances of the second novel term, E announced that they should stop, and removed everything from the table except the two target object sets – shuttlecocks and cups. E mixed the 10 objects from these two sets together with five objects from a third, distracter set. E then asked the child about possible referents of each of the two terms taught earlier ('ruk' and 'dob'). For each word, E always asked four questions to establish what the child had learnt: first, 'Show me all the dobs'; then, a follow-up question 'Can you show me another dob?' At this point, E checked further by asking 'Are there any other dobs?'; then E picked up or pointed to an object from the category not chosen and asked 'Is this a dob?' All child responses were noted on a score sheet.

After the test phase in the first (unspecified) condition, E said he had some new toys to play with. He encouraged the child to help him put away the previous toys in a large plastic bag that was then stowed under the table. E then introduced the first set of objects for the second (inclusion) condition and went through the same sequence of two learning phases followed by a test phase as before. But in this condition, as E introduced the new word for the first item in the second target set, he linked it to the first word learnt by saying, just once: 'a B is a kind of A,' and then continued with the teaching of the second word, B. At the end, after the test phase, E again encouraged the child to help him put away the toys, and went on to the third (repair) condition. In this condition, E taught the first word, A, for set-1, then glanced down at the score sheet on the table and said (again just once): 'Oops, I made a mistake: these are Bs, not As.' He then switched to teaching B for the items in set-1. This condition differed from the other two because E taught both terms for items in just one target set (set-1), although children were again tested in the presence of items from three sets – the five items from the target set, five from a second set similar in size and shape to the target set, and five from the distracter set. After that, E took the child back

[1] Woodward, Markman & Fitzsimmons (1994) found that children at 1;1 and 1;6 could learn new words from nine exposures. We used 12 as a minimum to make up for any momentary lapses of attention during the learning phases. See also Waxman & Senghas (1992), who used 10 exposures per word in their learning phase.

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to the classroom. The same E tested all the three-year-olds and approximately half the two-year-olds on their own; the remaining two-year-olds had one parent present, who remained silent and out of the child's line of sight throughout the session. The entire procedure took 10 to 15 minutes for the two-year-olds, and somewhat less time for the three-year-olds.

RESULTS

Overall, children responded very readily when tested on the words they had learned, with few instances of refusing to respond or saying 'I don't know' (except, as predicted, in the repair condition). In each test session, they saw a mixed set of 15 objects: five set-1 objects, five set-2 objects, and five set-3 objects. Children were counted as having learnt a word if they chose at least two target objects from each relevant set AND refused to choose any non-target objects when asked. Children's response patterns were classified on the basis of their combined choices and rejections. Most of them chose all the target objects most of the time and consistently rejected non-target ones. They seldom chose any distracter items from set-3, and showed no greater tendency to choose any distracter items in the first test phase than in the two later ones. When they chose non-target objects, they were consistent in choosing referents for one word from only one object-set.

The inclusion condition

In the inclusion condition, we predicted that children would learn that A included B because they would take into account E's one utterance of 'B is a kind of A'. 19 of the 36 children tested (11 two-year-olds and 8 three-year-olds) responded correctly: they chose both set-1 and set-2 for A, and set-2 only for B. If we assumed that, by the test phase, children had learnt that set-1 objects were As and set-2 objects Bs, then the chance probability that they would also treat set-2 objects as As, versus any other possible relation between A and B, is 0·0625. The fact that 19 children did just this is highly significant ($z = 11{\cdot}89$, $p < 0{\cdot}0001$, Binomial Test). There was evidence that other children also attended to the instruction about inclusion in this condition: these children gave partial inclusion responses. They either responded with both target sets for A (but gave no responses for B), or they responded with a single set to both A and B as if the terms were a superordinate and subordinate, respectively, but they did not respond with the other target set to either A or B. (The response patterns for partial inclusion are therefore more limited than that for full inclusion since children did not take into account both sets and both words.) When these children are added to those who gave full inclusion responses, a total of 17 of the 18 two-year-olds (94 %) and 10 of the 18 three-year-olds (56 %) offered evidence that they had taken in some or all of the information provided by E's single use of 'kind of' in the transition from A to B in the learning phases of the

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inclusion condition ($z = 16{\cdot}72$, $p < 0{\cdot}0001$, Binomial Test). The nine remaining children relied on some form of one-to-one mapping: one two-year-old responded with set-1 to A and set-3 (the distracter set) to B, as did 2 three-year-olds; 4 other three-year-olds responded with set-1 to A and set-2 to B. The remaining three-year-old responded with both target sets to both words. These data are shown in Table 1.

TABLE 1. *Number of children giving full or partial inclusion responses or other responses in the inclusion condition*

	Inclusion relation			
Age	Full	Partial	Other	Total
2;2	11	6	1	18
3;2	8	2	8	18

The unspecified condition

In the unspecified condition, we predicted that children would rely on general coping strategies since they received no explicit information about how the two words they were taught might be related to each other. So when asked for A's or B's in the test trials, they could well opt for different kinds of responses. Some children chose a one-to-one mapping, and treated set-1 members as As and set-2 as Bs; a few, perhaps attracted by novelty, treated set-1 as As and set-3 (instead of set-2) as Bs. If we assumed that by the test phase, children had already identified set-1 as As and set-2 as Bs, then the chance probability of their making no further mapping for either term is 0·0625. For 15 children to make just this choice was significantly greater than chance ($z = 8{\cdot}45$, $p < 0{\cdot}0001$, Binomial Test).

Other children in this condition treated one term as including the other. They either met the strict criterion for inclusion, with both set-1 and set-2 treated as As, and set-2 as Bs (5 two-year-olds and 3 three-year-olds), or the weaker criterion of either treating both target sets as As, or of having both A and B apply to set-2 (1 two-year-old and 4 three-year-olds), for a total of 13 children. If we assumed that by the test phase, these children had learnt word A for set-1 and B for set-2, then the chance probability of their also assigning A to set-2 is again 0·0625. For 13 children to make this choice was again significantly greater than chance ($z = 7{\cdot}07$, $p < 0{\cdot}0001$, Binomial Test). Lastly, a few two-year-olds decided that both words applied to both target sets. The two main strategies children relied on, then, were one-to-one assignments (5 two-year-olds and 10 three-year-olds) and inclusion (6 two-year-olds and 7 three-year-olds). Together these strategies accounted for the

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TABLE 2. *Number of children using each coping strategy in the unspecified condition*

	Age		
	2;2	3;2	Total
One-to-one			
A/set-1 & B/set-2 (B/set-3)	5	10	15
Inclusion			
A/set-1 + set-2 & B/set-2	5	3	8
A/set-1 + set-2	1	2	3
A + B/set-1	0	2	2
Mixed			
A + B/set-1 + set-2	4	0	4
A/set-1 only	1	0	1
Other	2	1	3

responses from 78% of children overall. The coping strategies used in this condition, and the numbers of children using each one, are shown in Table 2. (The three children listed under 'Other' appeared confused or distracted during testing and refused to make any choices in the test phase when asked.)

Since some children in the unspecified condition used inclusion, and some in the inclusion condition used a one-to-one assignment, it was possible that the order of conditions might have influenced those children. However, half the children who relied on inclusion in the unspecified condition received that condition before the inclusion condition, so order of conditions could not account for this result. The same absence of order effects held for one-to-one assignments: half the children in question were tested in the inclusion condition before the unspecified condition; the rest had the reverse order. In short, these children do not seem to have been influenced by the order of the conditions in their coping strategies for the unspecified condition. In the inclusion condition, those who opted for a one-to-one mapping in effect ignored the information E provided about the relation between the meanings of the two words taught.[2] In the unspecified condition, those who opted for an inclusion relation were guessing at a possible relation for which they had no explicit linguistic evidence. They were presumably relying on such factors as similarity of shape and size, along with shared function (see also Waxman & Senghas, 1992).

[2] Only 2 of the 10 three-year-olds who relied on one-to-one mapping in the unspecified condition did so in the inclusion condition. Likewise, only 1 of the 4 two-year-olds who used one-to-one mapping in the unspecified condition did so in the inclusion condition. This is further evidence that children did not rely on a single strategy for responding regardless of condition.

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The repair condition

In the repair condition, we predicted that children would take the repair into account and so only respond to the second of the two words taught when tested. Nearly all the children understood E's 'Oops, I made a mistake: it's not an A; it's a B'. Overall, 29 of the 36 children (13 two-year-olds and 16 three-year-olds) chose objects from set-1 in response to B (the predicted response). But in response to A, children were, quite logically, uncertain; they typically hesitated and then refused to make a choice, said 'Don't know', or offered no response at all. This held for 13 of the two year-olds and for all 18 three-year-olds. The five remaining two-year-olds paused, then guessed, choosing items from set-3 (the one set they had not seen during the learning phase for the two words). No children chose inclusion (full or partial). Notice that the learning phase for A was the same as in the other two conditions, with children hearing at least 12 uses of A for set-1 prior to the repair and switch to using B for set-1. These children therefore heard all the objects in set-1 called As jut as many times as they heard them called Bs. If by the time they reach the test phase, children have learnt that set-1 objects are Bs, the chance probability that they make no further change in their meaning for B, combined with no assignment to an object set for A, is 0·03125. That 29 children did just this, then, is highly significant ($z = 26{\cdot}22$, $p < 0{\cdot}0001$, Binomial Test). These findings are summarized in Table 3.

TABLE 3. *Number of children responding to B and to A in the repair condition*

	Responses to B		Responses to A	
Age	B/set-1	B/set-2 or set-3	No choice	Guess (set-3)
2;2	13	5	13	5
3;2	16	2	18	0
Total	29	7	31	5

Most of the children echoed E's uses of the new words during the two teaching phases in each condition, although some were silent, concentrating on playing with the objects in the target set (e.g. stirring water, picking up beans, or covering up smaller objects). They also produced the words during the test phase of each condition, with about half the children producing one or more of the words in question. In the inclusion and unspecified conditions, most of their uses appeared in assertions as the child carried out the actions demonstrated by E for each target set. When they produced the words, they used them accurately, as nouns, as in 'This is a ruk' (2;2), 'There's a dob'

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(3;5), and 'This is my dax and this is your dax' (3;3). They also modified these new words with adjectives, as in the typical 'I want another green gok' (2;3) and 'I'm going to use a red jad' (3;3). In the test phase of the repair condition, children also asked questions, often *sotto voce*, when they were asked about A (which had been taught and then replaced by B), as in 'This a gok?' (2;7) or 'What IS a dax?' (3;2). They never asked questions about B. Finally, boys and girls were equally likely to make use of the words being taught.

DISCUSSION

Children make use of pragmatic directions about new word meanings and how they are related to each other. When they are told two words are related by inclusion, they make use of that information. When they hear use of one word repaired, with the first word replaced by another, they take into account the repair in their assignment of meanings to the two words. But when children are not given pragmatic directions, they turn to a variety of coping strategies. These findings support our predictions about how children would respond when given pragmatic directions about inclusion and repair, versus no pragmatic direction about the words being learnt. In the INCLUSION CONDITION, where they heard an explicit 'a B is a kind of A' in the transition from the first to the second learning phase, children used this information about A and B in the test phase (see Table 1). In the UNSPECIFIED CONDITION, the children were given no information about how A and B might be linked. Not surprisingly, they relied on coping strategies, with the main options being to treat A and B as unrelated (a one-to-one mapping) or as related by inclusion, presumably on the basis of similarities of shape and function (see Table 2). In the REPAIR CONDITION, they were taught that set-1 objects were As, then heard A replaced by B with an explicit repair ('Oops, I made a mistake: they aren't As; they're Bs'). They then learnt set-1 were Bs in the second learning phase. Both two- and three-year-olds were very likely to treat B as designating set-1 objects; the same children typically refused to make any choice when asked about A. They had taken into account the repair from A to B, and so had 'erased' the first learning phase for A, and could assume now, for A, only that set-1 objects were NOT As.

Overall, the majority of children at both age-levels gave a different pattern of responses to each of the three conditions, as shown in Table 4. All the children responded differently in the repair condition from either of the other two conditions, and most of them (31 out of 36, or 86%) responded differently in the inclusion versus the unspecified condition as well. The numbers of children choosing specific response patterns, matched to each condition, show they were attending to each condition differently. That is, they took into account the available pragmatic information.

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TABLE 4. *Number of children who responded differently to the three conditions* (*unspecified*, *inclusion*, *and repair*)

Age	Unspecified & inclusion vs. repair	Unspecified vs. inclusion vs. repair
2;2	3	15
3;2	2	16
Total	5	31

Inclusion versus nonspecification

Both two- and three-year-olds managed to take account of the information about the inclusion relation holding between the meanings of A and B, such that B was included in A.[3] That is, even young two-year-olds appear to understand this relation in contexts where two sets of objects are similar in appearance and share the same function. This finding from the inclusion condition, where the relation was given explicit linguistic form (with 'is a kind of'), and from the unspecified condition, where children could go only on similarities of form and function, is consistent with the data from Waxman & Senghas (1992). In that study, children (mean age 2;1) were taught words, A and B, for a pair of related objects, a horn and a flute, say, and a third word, C, for an unrelated object, a hook, over the course of several sessions. At each visit, Waxman & Senghas assessed the children's understanding of the words, as measured through their comprehension and production: the children learnt all the words quickly and accurately. Although the researchers never specified explicitly what the relation was between words A and B, they found that two-thirds of the children assumed inclusion: they applied A, the first term taught, to both the horn and the flute, but B only to the flute. (The other third assumed a one-to-one mapping, with A only for the horn and B only for the flute.) This suggests that children can use properties of objects and their functions, as well as explicit pragmatic directions, in making inferences about how new words are related to each other.

Two-year-olds rely on the relation of inclusion when they construct novel compound nouns. They coin compound nouns like *orangejuice-spoon*[4] (for a

[3] Three-year-olds appeared to do worse than two-year-olds in the inclusion condition. While there was no difference for full inclusion (11 vs. 8 children), with partial inclusion children added, 17 two-year-olds took account of the information about inclusion, compared with only 10 three-year-olds. It is not clear what would account for this difference, but three-year-olds are perhaps aware of a larger number of possible relations among words than two-year-olds are; they also appeared to be less attentive overall.

[4] The hyphen between the two terms in these expressions indicates use of compound stress (heavy on the first element, lighter on the second).

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spoon being used to stir juice, 1;8.5), *baby-towel* (for a face-cloth, in comparison with a towel, 1;10.5), *duck-book* (for a children's book; 1;11.30), or *tea-sieve* vs. *water-sieve* (for a small and large strainer, respectively, 2;2.0) (Clark, 1993). Two- and three-year-olds make use of inclusion in their comprehension and production of novel compounds (Clark, Gelman & Lane 1985). There, children show that they are familiar with both terms in the compound and can use *spoon*, for instance, for the category of spoons, alongside compounds such as *orangejuice-spoon* or *cheerio-spoon* for subtypes of spoons.

Understanding of inclusion at age two to three has also been seen in tasks where children have to shift the perspective they are taking on an object, from calling a Richard Scarry character a *cat*, say, to calling it an *animal* (Clark & Svaib, 1997), or switching from calling someone a *man* to a *father* (Deák & Maratsos, 1997). And three-year-olds who were asked 'Is a cat a plant?', for example, readily reply, 'No, an animal' (see also Waxman & Hatch, 1992).

In summary, although children may find it difficult to grasp inclusion relations under certain circumstances,[5] they have some understanding of inclusion as a semantic relation holding between two words from as early as age two. Moreover, in the absence of explicit pragmatic directions about meaning relations, children can use whatever other information is available as the basis for choosing a coping strategy.

Repair

Children appear to be aware very early of what a mistake is, in talking, and they try to correct their own mistakes. They make repairs to their own utterances from the time they begin to produce words. Early studies of two- and three-year-olds' vocabularies noted numerous repairs where the children seemed to be correcting their own mis-pronunciations (see Clark, 1982). More recent studies have made similar observations and shown that such repairs typically move the child's pronunciation closer to the adult's (e.g. Scollon, 1976; Käsermann & Foppa, 1981). Moreover, children are sensitive to who they are repairing for: they make greater changes for strangers than for family members, and also distinguish between family members in what they repair when they fail to make themselves understood (e.g. Tomasello, Farrar & Dines, 1983; Tomasello, Conti-Ramsden & Ewert, 1990). Children also repair word choices (e.g. *boat* to *canoe*, 2;6), pronouns (e.g. *It's*...

[5] See Inhelder & Piaget, 1964; Piaget, 1965; also Shipley, 1975. Tversky & Kahneman (1983) showed that even adults failed to grasp inclusion in some settings, but it is possible that the sometime difficulties of inclusion in fact stem from the construal of the situation, whether we are talking about adults or six-year-olds (see Levinson, 1995; also Siegal, 1991).

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it's . . . he's too big, 2;8.21), number in the verb (e.g. *she want . . . she wants to go to sleep*, 3;7.14), and word order (e.g. *Down sand beach I been . . . I been down sand beach*, 2;6) (Clark, 1982). As they get older, they make repairs to syntax as well, for example, from an imperative to a question in a request, as in LP (6;7) doing the voice for a nurse in role-play: *Look . . .* ⟨repair⟩ *would you like to look at the X-rays, doctor?* (Clark & Andersen, 1979).

But how do children construe repairs made by others? The present study offers strong evidence that children as young as 2;2 understand that if a speaker repairs something, the speaker intends them to attend to the subsequent utterance. The evidence that children indeed act this way comes from the fact that despite having had just as many learning exposures to A used for set-1 as they did subsequently for B used for set-1, none of the children chose members of set-1 as As in the test phase. When asked about A, they all showed uncertainty, and nearly all refused to choose any object from the three sets on the table. A few two-year-olds, after considerable hesitation, chose an object, but they chose it from set-3, the one set that had not been visible during the two learning phases. Further evidence that two-year-olds attend to repairs as a reflection of the speaker's intention comes from a study of verb learning (Tomasello & Barton, 1994). During the teaching session, children were shown an inadvertent action, signalled by E's 'Woops' or 'Uhoh!', followed by the intended action, ratified by E's 'There.' All the children also learnt one verb with the other order: intended before inadvertent action. Children were significantly more likely to learn verbs for the intended actions than for the inadvertent ones, regardless of order of exposure. Similar findings hold for rejected versus accepted objects in the learning of nouns. In short, two-year-old children clearly understand what a repair connotes about how to interpret an utterance as whole – having heard a repair, they understand what to discard and what to retain.

This ability, of course, is what allows adults to rely on their children's responses to requests for repairs. When adults fail to understand their children's utterances, they ask clarification questions (e.g. Corsaro, 1977; also Jefferson, 1974). And children can and do respond to them. Finally, the younger the children are, the more frequently adults make requests for repairs (e.g. Corsaro, 1977; Tomasello, Conti-Ramsden & Ewert, 1990).

Coping strategies

When adults offer pragmatic directions about how to relate word meanings, they offer children direct information about the kinds of relations they should set up. But such directions are not always present, and then children must rely on general coping strategies as they make preliminary inferences about how new words might be connected. In the unspecified condition, where children received no pragmatic directions, they relied on a range of coping strategies (Table 2). The two main ones were to assume either inclusion or a

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one-to-one mapping. One or two children took a third route and assumed both words applied to both target sets, and one or two appeared confused and ended up mapping only one of the words onto one (or both) target sets.

The two main coping strategies observed here are often favoured elsewhere: inclusion and one-to-one mapping. Waxman & Senghas (1992) found that two-year-olds opted for inclusion and, to a lesser extent, one-to-one mapping, in their comprehension and production of new words. Taylor & Gelman (1989) also found that two-year-olds favoured inclusion: they tended to interpret a new word as referring to a subkind of a known category. In summary, if the speaker does not specify the relation between two words, children can call on a range of coping strategies (Clark, 1997). But if the speaker provides a pragmatic direction that specifies the relation, children can make use of just that information in deciding how to relate one word to another on that occasion.

Pragmatic inferences

When children take part in experiments, they make inferences about what E wants based on the physical setting and their prior knowledge about conversational practice. With physical setting, because they do not fully understand what the researcher wants them to do in some tasks, they may take into account factors that are irrelevant (e.g. Donaldson, 1971; McGarrigle & Donaldson, 1975). For instance, in some conservation tasks, children have assumed that changes of position in the objects being judged are relevant: when shown two sticks the same length, laid parallel, and asked if they are the same, children readily answer 'yes.' But if E then moves one stick so the ends are no longer aligned, children aged three to five now answer the same question with 'no'. If trained to ignore irrelevant factors, they do much better (e.g. McGarrigle, Grieve & Hughes, 1978).

Because of conversational practice, children tend to construe questions asked in experimental tasks just as they would questions asked in conversation. For instance, in conversation, if a speaker repeats a question after the child has offered an answer, the assumption is that the answer was inappropriate. So speakers use repeat questions to request a different answer. Consider the effect of such an assumption on standard Piagetian conservation tasks: E asks four- to six-year-olds repeated questions to establish that children are quite certain of their conservation responses. And children this age typically change their answers the second time and so appear unable to conserve. But when given a one-question test format before a standard two-question test, children produced many more conservation responses on the latter than did children who first got the standard test and then the one-question version, by 59 to 19% (Siegal, Waters & Dinwiddy, 1988). Having the one-question test first helped make clearer to the children what information was relevant in the task, and hence what the adult wanted to know.

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In the present study, the adult speaker provided an explicit spoken pragmatic direction about the relation between the two new words being learnt in two of the conditions – inclusion and repair. In this respect, these two conditions mirrored what is typical in adult–child conversations. Adults offer frequent pragmatic directions about how one word is related to another, and they also repair what they say when they make mistakes. But since there was no direction given in the unspecified condition, children had to make their own inferences about what was pertinent when they answered the questions in the test phase. In doing this, they drew on two main coping strategies: they assumed either an inclusion relation or a one-to-one mapping (one word/one target set). Coping strategies offer children a resource for dealing with pragmatically unspecified or underspecified conversational contexts.

Lack of specification seems to be characteristic of many word learning studies. Three- and four-year-olds are presented with objects and taught unfamiliar terms for them, and then tested. But the relations between two new terms, or between a familiar and an unfamiliar term, typically go unspecified. So children in the test phase of such studies have to cope as best they can. This may lead them, on some occasions, to adopt a one-to-one mapping. But notice that such a coping strategy is just that. It is not a general constraint on the kind of relation children can conceive of as holding between words, or words and object kinds. It does not represent an inability on the child's part to learn that two words are related by inclusion; nor does it represent an inability to apply two terms (rather than just one) to the same referents (see further Clark, 1997).

In short, the present findings show that children are sensitive, from a young age, to the pragmatic directions adults offer about word meanings when they are learning new words. This in turn suggests that children are not affected by semantic constraints so much as by pragmatic directions. Reliance on one-to-one mapping (one word to one set of objects), for instance, is consistent with mutual exclusivity (Markman, 1989; Merriman & Bowman, 1989). But in light of the SAME CHILDREN'S ability to use pragmatic directions for an inclusion relation and for dealing with a repair, one cannot conclude that they are constrained to use just one term to refer to one kind of object. Rather, some of the constraints that have been proposed instead reflect coping strategies that children rely on when they do NOT receive adequate pragmatic directions.

SUMMARY

The present study compared children's learning of new words in three conditions. When they received pragmatic directions about relating the two new words through inclusion, or about substituting one word for the next after a repair, children acted in accordance with the directions. When they

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received no pragmatic directions about the relation between the two new words, they relied on coping strategies. These data support the hypothesis that children as young as two make direct use of pragmatic directions when they learn the meanings of new words.

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