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Word Magic Revisited: Monolingual and Bilingual Children's Understanding of the Word-Object Relationship

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ROSENBLUM, TAMAR, and PINKER, STEVEN A. *Word Magic Revisited: Monolingual and Bilingual Children's Understanding of the Word-Object Relationship*. CHILD DEVELOPMENT, 1983, 54, 773-780. We examined the claims that preschool children regard an object's name as being inseparable from its intrinsic properties and that bilingual children relinquish this notion earlier than monolingual children. 12 monolingual and 12 bilingual children of equivalent SES, nonverbal intelligence, talkativeness, and willingness to consider counterfactual situations were asked whether various objects could be renamed and then asked to identify objects by nonsense names and names for other objects. Virtually all the children performed the renaming tasks without error, and the monolinguals and bilinguals were equally likely to assent to renaming objects. However, monolinguals were more likely to mention an object's properties when justifying an answer, whereas bilinguals were more likely to mention the social context of the renaming act. These findings suggest that neither bilingual nor monolingual children are necessarily subject to "word magic"; rather, monolinguals have learned that an object can have more than 1 name by virtue of its various attributes, whereas bilingual children have learned, in addition, that an object can have more than 1 name by virtue of the different social contexts in which its name is used.

One of the more intriguing claims that have been made about children's lack of metalinguistic awareness is that they cannot grasp the arbitrary nature of the word-object relation. Piaget (1929) observed that preschool children answer questions about why objects have the names they do as if they believed that the word is "magically" connected to the object or that the word is an intrinsic property of the object, like its size or color (a phenomenon he called "nominal realism"). In the same vein, Vygotsky (1962) noted that children give idiosyncratic answers to questions calling on them to manipulate names, such as "Can you call this dog a cow?" and "Can this 'cow' give milk?" (e.g., they would assent to the latter).

If preschool children have difficulty appreciating that words and objects are related by convention only, it would be natural to expect that bilingual children, who know two words for most objects, would come to appreciate this fact at a younger age. Indeed, diary studies (Leopold, 1949; Slobin, 1978) contain reports of bilingual children making precocious observations about words and their properties (though, of course, these may have been precocious children in general). Observations of groups of monolingual and bilingual children have shown that bilinguals often are more willing to refer to an object by a nonsense or unconventional name (e.g., Ben-Ze'ev, 1977; Feldman & Shen, 1971; Ianco-Worrall, 1972) or to articulate the

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principle that words and objects are related by arbitrary convention (Cummins, 1978). However, these differences in answers to questions have not always translated into behavioral differences (e.g., Cummins, 1978; Ianco-Worrall, 1972), and occasionally no differences have been found in tasks of understanding the word-object relation (e.g., Pinker, 1979; Sandoval, 1976).

In any case, we would like to argue that neither hypothesis—that preschoolers believe words to be intrinsic properties of their referents and that bilingual children are disabused of this notion earlier, when they learn two names for an object—receives unambiguous support from these data, even if the data were perfectly consistent. We see three problems of interpretation concerning these studies.

1. Children's interpretation of the questions: There is reason to believe that children's answers to the experimenter's questions in Piagetian tasks may not always reflect their cognitive abilities accurately (see Siegel, 1978). This could affect the interpretation of children's metalinguistic judgments in several ways. First, preschoolers do not seem to understand fully the words for linguistic entities and relations such as *word*, *say*, *means*, *sounds like*, and so on (Slobin, 1978). Furthermore, children (Osherson & Markman, 1975) and adults in preliterate cultures (Cole & Scribner, 1974) often answer logical questions or hypothetical questions as if the questions referred to empirical states of the world rather than to the necessity, possibility, or impossibility of the premise itself. Thus the somewhat bizarre question "Can you call a cow a tree?" may be interpreted as the far more plausible "Is the English word for a cow 'tree'?" (see Markman, 1976); therefore, the children's answers in the negative may not be as anomalous as they would first appear. This might be so because children are incapable of entertaining counterfactual information of any sort or because they choose not to interpret the question in its hypothetical sense owing to the bizarreness of that interpretation in the discourse context (see Grice, 1975). On this interpretation, if the children were "set" to attend to counterfactual information in that context, they might indeed answer the name-switching question in an adult-like way.

2. Variables confounded with bilingualism: Bilingual children may differ from monolinguals in more ways than simply knowing another language. In any given sample they

may be brighter, higher in socioeconomic status, more likely to entertain counterfactuals, or simply more talkative in an experimental setting (in which case they might give "better" answers to open-ended questions simply because they are willing to proffer an extended answer, whereas shyer children would answer in monosyllables, if at all). Interestingly, in each of the studies reporting differences between monolingual and bilingual children, one or more of these factors were not equated (e.g., intelligence for Feldman & Shen, 1971; SES for Ianco-Worrall, 1972; talkativeness and comprehension of counterfactuals in all the studies); and in the studies that failed to find statistically significant differences (Pinker, 1979; Sandoval, 1976), both intelligence and SES were equated.

3. Interpreting differences—semantic versus pragmatic knowledge: It is not really true that monolingual children hear a single name for an object; consider, for example, *Sparky*, *dog*, *poodle*, *pet*, *animal*, and *living thing*. What differentiates the bilinguals' experience from the monolinguals' is that, when a monolingual child hears a new word for an object (synonyms aside), the new word will differ semantically from the known name (e.g., *animal* refers to any animate creature, whereas *dog* refers only to those with a muzzle, fur, a bark, etc.). In contrast, when a bilingual child hears a new word for an object, often the new word will differ in that it is used in a different social context (e.g., in school vs. at home; when speaking to mother rather than to father). Thus, monolinguals may learn that an object is referred to by two or more names by virtue of its individuality and its physical properties, whereas bilingual children learn that an object is referred to by two or more names by virtue of those attributes as well as its use in different discourse contexts. As a result, in an experimental setting, bilinguals might be more likely to agree to dubbing an object with a new name precisely because the experiment is a different social setting from that in which the regular name applies; the differences would be in the children's knowledge about when and why an object can have a second name, rather than whether it can have a second name or any other possible misconceptions about nominal realism or word magic. Simply obtaining a child's assent or dissent to switching names (e.g., Ben-Ze'ev, 1977; Feldman & Shen, 1971) will not settle this issue; at the very least, one would need the children's rationales

for their assent or dissent to see if they referred to an object's properties, the social setting, or both.

This study was designed to address these three objections to the conclusion that monolingual, but not bilingual, children are susceptible to nominal realism. To address the objection about children's interpretation of the question, we presented the children with a nonlinguistic example of a counterfactual scenario and assessed whether they could entertain and comprehend the scenario. This serves three purposes. First, if all the children fail this test, we could attribute any subsequent general failure in a name-switching task to an inability to consider counterfactuals rather than to a metalinguistic deficit *per se*. Second, if bilinguals could pass the test but monolinguals could not, any subsequent differences between groups in the metalinguistic task could be attributed to this general cognitive difference. Third, if both groups would ordinarily balk at name switching but would agree to it only if "set" to attend to counterfactuals seriously, this test would provide the appropriate set and, if all children passed it, would give us more confidence that any subsequent failures in the name-switching task reflected metalinguistic deficits.

In addition, we ensured that our groups were equivalent in education and socioeconomic status by using Hebrew-English bilingual children of Israeli emigrants (who, unlike many bilingual groups, tend to be above average in parental education and SES); we also assessed the children's nonverbal IQ, their vocabulary development, and their general talkativeness. Finally, to assess whether differences are in semantic or pragmatic knowledge, we recorded the children's reasons for their answers on several name-manipulation tasks rather than simply the answer itself.

Method

Subjects

The subjects of the study were 12 English monolingual and 12 Hebrew-English bilingual preschoolers of equivalent age, sex, nonverbal intelligence, and socioeconomic status. The subjects ranged in age from 4;0 to 5;10; the monolingual group's average age was 4;9, and the bilingual group's average age was 5;1, $t(22) = 1.25$, N.S. In each group, seven subjects were girls and five were boys.

Nonverbal intelligence was evaluated by two performance tests from the Wechsler Preschool and Primary Scale of Intelligence (Wechsler, 1963). The "Animal House" subtest, which requires the child to associate one of four colored pegs with each of four animal pictures, was chosen because it is a visual analog to the name-learning and usage tasks. The mean for the monolingual children on this subtest was 12.8; for the bilingual children, it was 13.1, $t(22) = .30$, N.S. In addition, the Block Design subtest, which requires the child to arrange blocks so as to reproduce geometric patterns from models and pictures, was chosen because it is relatively language-independent and, unlike Animal House, does not have a parallel in the interview procedure. The means for the monolingual and bilingual children were 14.0 and 14.4, respectively, $t(22) = 1.27$, N.S.

All subjects were children of professionals or university affiliates and were enrolled in English-language child-care centers in the Boston area. All of the bilinguals were children of either Israeli Hebrew-speaking families who had moved to the United States but still spoke Hebrew in the home or (in two of the 12 cases) American English-speaking families who returned from an extended stay in Israel with their Israeli-born Hebrew-speaking child. One of these children spoke Hebrew at home; the other spoke English. Their data were comparable to those of other children in the bilingual group. The monolinguals were also all children of professionals; four of the 12 were known to be Jewish.

Bilingual subjects were selected according to three criteria. First, each of the bilingual subjects used both languages daily in different settings: Hebrew with family at home, and English with peers in the day-care center. We sought a reasonable balance between proficiency in the two languages, which we assessed by speaking with the child in both languages and interviewing the parents about the child's language history. Finally, if a child satisfied both these criteria, the Peabody Picture Vocabulary Test (PPVT) was administered in both its English standardized form and in a Hebrew nonstandardized translation. For the bilingual children, half the PPVT items were administered in one language, then the other half were administered in the other language; which half set was given in which language was counter-balanced across subjects. The first language tested was always the language in which the interview was conducted (see below). To

tabulate the PPVT scores based on half the test questions, the basal and ceiling items were established as usual, but twice the number of correct responses between the two points were added to the basal score to compensate for the halved number of test items. We chose a 50-point difference between English and Hebrew PPVT scores as the maximum allowable disparity for inclusion in the bilingual group. Using these criteria, we selected 12 children from the 16 originally tested.

Monolinguals scored significantly higher than the bilinguals on the English PPVT—monolingual $\bar{X} = 116.5$, bilingual $\bar{X} = 89.1$, $t(22) = 4.75$, $p < .001$. The Hebrew scores cannot be compared directly with the English scores because the translated version is not standardized. Lower PPVT scores were expected for the bilinguals; their vocabulary development in each language tends to lag somewhat behind that of their monolingual counterparts until the middle school-age years, presumably because the bilingual child has exposure to fewer words or a reduced amount of exposure to any word in a given language than the monolingual has (see Ben Ze'ev, 1977; McLaughlin, 1978).

Procedure

Each child was interviewed individually by the first author in a quiet room. All the monolingual children were tested in day-care centers; four of the bilinguals were tested in day-care centers, and eight in the child's home. Each session lasted approximately 40 min and was tape-recorded. For the bilingual children, the choice of language in which the interview was to be conducted was left to the subject. All four bilinguals interviewed in the day-care center chose to speak English, and six of the eight children tested in their homes chose to speak Hebrew; therefore, it turned out that half of the bilinguals were tested in English, and half of them were tested in Hebrew.

After getting acquainted with the child, the experimenter administered the test of comprehension of counterfactuals, the test of volubility, and the name-manipulation test (which had five parts), followed by the WPPSI Animal House subtest, the PPVT, and the WPPSI Block Design subtest.

Counterfactual test.—The experimenter put on a blue-haired puppet and explained that "Mr. Blue" was from a "faraway country, where everyone has blue hair [turns puppet around to show its blue hair], walks on

their hands [demonstrates], and rides tricycles to work." The experimenter then offered the puppet to the child, who then assumed the role of Mr. Blue. The experimenter prompted the child to have Mr. Blue repeat his story in the first person. At this point the experimenter ceased prompting and asked the child three questions: "Is your hair the color of the earth or of the sky?" (correct answer: sky); "When you go for a walk, do you put your shoes on the part of your body that has fingers or that has toes?" (correct answer: fingers); and "Do the grown-ups ride to work on something that has three wheels or that has four wheels?" (correct answer: three). The order of mention of the two alternatives in each question was counterbalanced across children. Note that the form of these questions is similar to the form of questions on the name-switching tasks: first the child is asked to accept some counterfactual; then he or she is asked to deduce some implication of the counterfactual.

Test of volubility.—Each child was first asked to name five common toys (boat, giraffe, horse, table, truck), then the experimenter asked two questions: "Which one do you like best?" and "Which two of these are most alike?" The number of content words in the child's response (nouns, adjectives, and main verbs other than *to be*, which has no present tense form in Hebrew) were recorded. Because these content words correspond one to one in English and Hebrew, this measure may be used to assess whether monolingual and bilingual children are equally voluble or shy in the experimental setting.

Name-manipulation test.—The experimenter began the interview itself by addressing two hypothetical questions to the child—"Can you call this table a *shig*?" and "Can you call this boat a *cow*?"—and then asked the child to justify his or her responses.

The experimenter next administered three "renaming" tasks. First, the experimenter said "Let's call this table a *shig*," referred to the object by that name in two requests ("Hand me the *shig*" and "Put the *shig* next to the truck"), and asked for a justification with the question, "Why can we now call the table a *shig*?"

Second, the child was taught a different name, but one already existing in the child's language, for another of the objects on the table (e.g., *cow* for boat), responded to requests as before, and, in addition, answered questions about the object's characteristics

("Does this 'cow' have legs or a smokestack?"; "Does it walk or does it sail?"; order of alternatives was counterbalanced). As before, the child was asked why the renaming was or was not possible.

Third, the child learned to call an object by the name of another object on the same table (e.g., *truck* for giraffe). As before, the child was asked to manipulate the object as referred to by its new name, was asked whether it had wheels or eyes and whether it drives or eats, and was asked why the renaming was or was not admissible. In addition, in this case the child was asked, "If that's a *truck*, what is this?" A larger but otherwise identical toy giraffe was shown, giving the children the opportunity to generalize from the name they had learned in the interview framework to another instance of the same object.

Results

Comprehension of Counterfactuals

All children tested answered the three questions correctly with ease, with the exception of the question, "Does he put his shoes on the part of his body that has fingers or that has toes?" Two bilingual and one monolingual subject (out of the 24) answered this question incorrectly. In view of the success of the other 21 children, and of these children with the other two items, it seems reasonable to conclude that our children, both mono- and bilingual, had little difficulty processing information introduced in counterfactual situations.

Control for Volubility

There was no significant difference between the mean scores of the two groups in volubility. The mean number of content words for both questions for the monolinguals was 12.3, and for the bilinguals was 10.5, $t(22) = 1.11$, N.S.

On the basis of these two controls and the measures reported in the Subjects section, it can be concluded that any differences in the performance of the two groups on the name manipulations are unlikely to result from differences in the groups' socioeconomic status, ability to accept counterfactual situations, nonverbal intelligence, or volubility, but from the group's knowledge of a second language per se.

Name-Manipulation Test

The first two questions were hypothetical inquiries into whether calling an object

by a nonsense name or by a different name was acceptable or unacceptable. The number of bilinguals and monolinguals who agreed and disagreed with the possibility of calling a table a *shig* was identical (seven out of 12, $\chi^2[1] = 0$). Seven bilinguals and four monolinguals assented to calling a boat a *cow*, a nonsignificant difference, $\chi^2(1) = 1.51$, N.S. These results show that neither group was significantly more influenced than the other by so-called word magic.

There were also no differences between the monolingual and bilingual groups' performance on all three of the name-learning tasks. All 24 subjects successfully responded to commands to manipulate the objects when they were referred to by a nonsense name (*shig* for table), a different name (*cow* for boat), and a switched name (*truck* for giraffe, when a truck was also present). All children chose the correct property for an object over a property associated with the referent of its new name, except for one monolingual child and one bilingual child when asked about the object with the switched name. Only on the third task—the generalization from one instance of a newly learned switched name to another ("If this is a *truck* what is this?")—did some of the subjects have difficulty. Four of the monolinguals and three of the bilinguals treated the giraffe as a second instance of the learned name *truck*, but the remaining children did not make that generalization and called it a *giraffe*. None of these small differences between monolinguals and bilinguals was statistically significant.

Although all of the subjects performed similarly in their ability to give the correct answers in the name-manipulation tasks, the two groups differed significantly in their explanations for their performance when responding to the two questions "Why can/can't you call this X a 'Y'?" or the three questions "Why can/can't we now call this X a 'Y'?" following the name changes. The subjects' reasoning about the possibility of name manipulation was assessed in the following way. We excluded any putative explanation that simply mentioned the name of the object (e.g., "You can't call it a *shig* because it's a table") or that made no sense (e.g., "You can't call it a *shig* because it's nothing," or "It's not a *shig*, it's a pig, oink! oink!"). If a child could give an interpretable reason for his or her answer, it was then assigned to one of two subcategories that we found, post hoc, to account for most of the reasons: reasons based on objects' *attributes* ("because

they're both green"/"because it doesn't have green on it," or "because it has four legs"); or reasons based on the experimental, situational, or personal *context* in which the name transfer was acceptable (e.g., "because it's in our game," or "because you told me and I know . . . I know what it is and you know what it is," or "because it's not true in life," or "because the kids [downstairs] wouldn't know . . . because we didn't tell them"). In addition, in the last task (calling an object by the name of another on the table), five of the children (four monolinguals and one bilingual) gave reasons based neither on the context nor attributes but on the ambiguity that would arise from having "two trucks." These responses were assigned to a third category and excluded from the analysis described below.

The Hebrew responses were all translated into English, and all the responses were typed on slips of paper, which were given to a naive rater, unlabeled as to source and in a random order. The rater then assigned them to "context" and "attribute" categories, agreeing in 95% of the cases with the first author's judgments. The second author, unaware of the group from which the child came, scored the responses on the remaining 5% of the answers.

Two findings emerged from this analysis. First, in all five tasks, bilinguals offered more reasons for their behavior than monolinguals. More interestingly, the monolingual and bilingual children differed in the types of reasons they gave: monolinguals referred to the attributes of the object more often than to the context of the naming exercise in all five questions, whereas bilinguals referred to the context more often than to the attributes in four of the five questions. This interaction can be tested in two ways. First, a child can be categorized as "context" if the majority of his or her reasons were based on reference to the context and "attribute" if the majority of reasons were based on the object's attributes. Nine of the 12 monolinguals based their responses predominantly on the object's characteristics (categories were tied for two children), whereas eight of the 12 bilinguals based their responses predominantly on the context, $\chi^2(1) = 5.04, p < .05$. Second, one can perform a *t* test on the mean scores of each group, where each subject was scored on the number of reasons based on context (out of five possible) minus the number of reasons based on attributes (also out of five)

across the interview questions. Out of a possible score of +5 (all five answers were reasoned on the basis of context) to -5 (all five answers were reasoned on the basis of attributes), the monolingual mean score was -1.17, and the bilingual mean score was 1.17, $t(22) = 2.05$, one-tailed $p < .05$. This difference remains significant even when the scores are adjusted for age in an analysis of covariance, $t(21) = 1.88$, one-tailed $p < .05$.

Discussion

Our results show that middle-class preschoolers are not necessarily seduced by word magic, do not necessarily treat an object's name as inseparable from its attributes, and do not necessarily fail to realize that an object can be given a new arbitrary name. All 24 of our subjects were able to identify a familiar object when it was referred to by a new, nonsense name and by a name ordinarily used for a different object; 22 of the 24 were even able to understand a new name that referred to another object currently in view. These children were also able, in similar proportions, to answer questions about a renamed object's attributes without imbuing the object with the properties of the new name's conventional referent. Even in the hypothetical questions demanding more reflection on the part of a child ("Can you call this table a *shig/cow*?"), which children allegedly deny, about half of our subjects responded "yes" (58% and 46% for the nonsense name and the new name, respectively). And it is possible that the children who answered these questions in the negative may have done so not because of word magic but for the reasons outlined in the introduction—that is, the question may have been construed as being about the object's true name in English. (In fact, the ideal adult response to the question would be something like "You could, I suppose, but that's not its name," and if one was speaking to a person learning English, even that response would be inappropriate. In an informal survey of six Stanford students and staff, we found that all six thought that the "correct" answer to the question is "no.")

We cannot be certain why our results differ from previous ones. It could be, as we proposed in the introduction, that our questions about hypothetical situations set the child to entertain questions and requests concerning counterfactuals; alternatively, our children could have been more precocious

(they were all children of professionals), or our procedure more congenial to the child, than those used in the past.

Our second conclusion is that there is little evidence for a difference in awareness of the word-object relation between monolingual and bilingual children when confounding factors such as nonverbal intelligence, SES, volubility, and willingness to entertain counterfactuals are controlled. Our two groups were equally likely to assent to the possibility of calling an object by a new, nonsense name; were equally able to learn new nonsense, different, and switched names for an object; were equally able to identify an object's intrinsic properties despite a distracting name change; and were equally unlikely to generalize a new name to a similar object. Although there may be small quantitative differences between mono- and bilingual children that our measures, many of which were at ceiling, were incapable of detecting, there does not seem to be a dramatic difference in susceptibility to word magic, with monolingual children utterly incapable of considering alternatives to the conventional name for an object.

The third conclusion from this study is that there indeed does seem to be a difference between monolingual and bilingual children's awareness of the word-object relation, even if that difference is not that one group is aware of the nature of the relationship and the other group is not. Rather, it is that the two groups articulate different aspects of that relationship. Monolingual children are more likely to refer to the physical properties of an object when justifying or denying a new name for it (e.g., you can call the giraffe a *truck* because it has four legs and the hooves look like wheels, or you can't call a boat a *cow* because it doesn't have legs), whereas bilingual children were more likely to refer to the social context of naming or the shared knowledge that results (e.g., you can call it a *cow* "because it's in our game"). These responses are perfectly consistent with what the child must deduce about word meanings when he or she learns words. For a monolingual child, objects are given several names, which are distinguished by virtue of the properties of the objects in their extensions (e.g., *Sparky* may be used to refer only to the dog with a specific appearance, behavior, and domicile; *dog* may be used as a name for any creature within a far wider range of appearance and behavior, including attributes that

Sparky may lack; *animal* may be used as a name for a class of creatures possessing a still wider class of attributes; and so on [see Anglin, 1977; Carey, 1978; Clark, 1973; Macnamara, 1982]). As a result, a monolingual child might come to the conclusion that any object can have a variety of names, each being appropriate to the object only when certain of its properties, the ones specified by the word's meaning, are to be emphasized. In fact, such "attribute" responses are not necessarily wrong or silly; the following hypothetical adult dialogues, for example, have a plausible ring to them: "Can you call garlic a *vegetable*?" / "Yes, because it is an edible plant/No, because it is too small and pungent to be eaten alone"; or "Can you call this computer an *engine*?" / "Yes, because it is mechanical and runs automatically/No, because it doesn't move."

Bilingual children clearly must share this experience with monolinguals; in fact, they provided similar numbers of answers referring to attributes as did the monolingual children (1.4 vs. 1.7 reasons). However, the far greater number of reasons they offered referring to the naming context (2.5 vs. .5 reasons) probably reflects their experience with a different set of contingencies about names. A bilingual child must learn that he or she can give a dog the name *dog* when addressing a certain person or type of person or when in a particular situation, but that that beast must be given the name *chien* when addressing other people or in a different setting. As a result, a bilingual child may realize that objects can have two different names by virtue either of various subsets of its attributes or by virtue of the various social contexts in which the object is named. The justifications the children gave for renaming an object in this study reflect just that knowledge.

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