Published in final edited form as:

Child Dev. 2008 ; 79(3): 750–760. doi:10.1111/j.1467-8624.2008.01155.x.

Limitations on Reliability: Regularity Rules in the English Plural and Past Tense

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Abstract

Two studies investigated 3- to 5-year-olds' trust in a reliable informant when judging novel labels and novel plural and past tense forms. In Study 1, children ($N=24$) endorsed the names of new objects given by an informant who had earlier labeled familiar objects correctly over the names given by an informant who had labeled the same objects incorrectly. In Study 2, children ($N=24$) endorsed novel names given by an informant who had earlier expressed the plural of familiar nouns correctly over one who had expressed the plural incorrectly. But children overwhelmingly endorsed the regular plural and past tense forms of new words provided by the formerly unreliable labeler (Study 1) or morphologist (Study 2) rather than irregular forms of those words provided by the formerly reliable informant.

From a very early age, English-speaking children can easily generate the regular plural and past tense forms of novel nouns and verbs. For example, in a classic study, Berko (1958) showed 4- to 7-year-olds, a picture of a novel creature and referred to it as *a wug*. They were then shown two of the same kind of creature and were prompted to provide the plural: "Now there are two —." Most children responded by saying *wugs*. When they were shown a picture of a novel action called *ricking* (e.g., a man swinging a spiky ball around) and prompted to provide the past tense, most children responded by saying *ricked*. Although some words are easier for children to regularize than others (e.g., *wugs* is easier than *nizzes*, *ricked* is easier than *motted*), the basic phenomenon is quite robust: Children can create the regular plural or past tense forms of words they have never heard before.

The vast majority of English nouns and verbs fit this regular paradigm (i.e., add – s for plural, add – ed for past tense). But 2% of noun plural types and 14% of the 1,000 most common verb past tense types are actually irregular (Marcus, 1996). For example, the plural of *mouse* is *mice*, not *mouses*; the past tense of *go* is *went*, not *goed*; and so on. This raises an important question: Given children's robust expectations about regularity, how do they deal with input that suggests that a particular word takes an irregular form?

On the one hand, we know that they do not automatically dismiss this input because of course, they do learn that some words are irregular. On the other hand, we also know that they do not automatically accept any input that conflicts with their expectations. For

example, Naigles, Gleitman, and Gleitman (1993) found that 3- and 4-year-olds who heard a familiar intransitive verb used transitively (e.g., “The lion comes the giraffe”) tended to treat that unexpected usage as if it were an error (e.g., as if the speaker meant to say “The lion *comes to* the giraffe” or even “The lion *combs* the giraffe”). The issue of how children reconcile input about irregular nouns and verbs with their expectations about regularity is complicated further by the fact that they sometimes hear overregularized tokens. Their peers, for example, sometimes say *breaked* instead of *broke* and *foots* instead of *feet*. The plural or past tense of the very same word, then, may be regular and consistent with their expectations on some occasions and irregular and inconsistent with their expectations on others.

One strategy children might use to navigate this situation is to weight the forms they hear from some speakers more heavily than those they hear from others (Kuczaj, 1978). A good deal of recent research has shown that, at least when learning the names or functions of novel objects, children are very sensitive to how accurate a potential informant has been in the past (e.g., Clément, Koenig, & Harris, 2004; Harris, Pasquini, Corriveau, Koenig, & Clément, in press; Jaswal & Neely, 2006; Koenig, Clément, & Harris, 2004; Koenig & Harris, 2005a, 2005b). For example, Koenig et al. (2004) presented children with a video showing two adults labeling familiar objects. One adult always provided correct labels for the objects (e.g., called *a book* a book), whereas the other always provided incorrect labels for the same objects (e.g., called the book *a chair*). Later, the two speakers labeled novel objects with different novel labels (e.g., a white bulbous object was called *a wug* by one actor and *a dax* by the other) and children had to decide which of the two labels applied. Children generally preferred the formerly reliable speaker's novel labels. In fact, Jaswal and Neely (2006) showed that reliability is so powerful that 3- and 4-year-olds will override their normal assumption that an adult is a better informant about the names for objects than a peer if the peer has been more reliable than the adult in the past.

In the two studies reported here, we investigated whether a speaker's history of reliability would also influence children's willingness to accept a plural or past tense form from that speaker. Specifically, we asked whether children would endorse an *irregular* form of a novel word from a formerly reliable informant over a *regular* form of the same word from a formerly unreliable one. It is important to note that this question differs in a fundamental way from the one that has been asked in previous research on reliability. In nearly all the previous work, the testimony of the reliable and unreliable informants concerned the name of a novel object or its function—facts that the participants presumably had no expectations about (e.g., Harris et al., in press; Jaswal & Neely, 2006; Koenig et al., 2004; Koenig & Harris, 2005a, 2005b; but see Clément et al., 2004). In the studies reported here, in contrast, the testimony of the two informants concerns the appropriate inflectional morphology for a novel word—something that, as Berko (1958) demonstrated and as described above, the participants will have robust expectations about. Our interest is in whether children will discount their expectation about regularity when an irregular form is provided by an informant who has been a reliable source of information in the past.

In Study 1, reliability was induced through labeling: Children heard one informant provide the accurate labels for familiar objects and the other provide inaccurate labels. As in earlier work (e.g., Koenig et al., 2004), children were asked to choose which speaker's novel labels applied to novel objects. But in addition, they were asked to choose which speaker's plural and past tense forms applied to novel nouns and verbs. Study 2 was similar, except reliability was induced through regular plural morphology.

Study 1

In Study 1, we provided 3- to 5-year-olds with the opportunity to learn which of two informants was a reliable labeler (see Jaswal & Neely, 2006; Koenig et al., 2004): One of the speakers provided accurate labels for each of four familiar objects (e.g., referred to an airplane as *an airplane*), whereas the other provided inaccurate labels for the same four objects (e.g., referred to the airplane as *a glass*). Following this reliability induction phase, the two informants provided conflicting labels for a series of novel objects and children had to decide which label applied. Here, we expected to replicate earlier work, which, as described earlier, has shown that preschoolers prefer learning new labels from someone who has accurately labeled familiar objects rather than someone who has inaccurately done so (e.g., Clément et al., 2004; Harris et al., in press; Jaswal & Neely, 2006; Koenig et al., 2004).

In the critical and novel part of the procedure, children were given a truth-value judgment version of Berko's (1958) *wug* test. Instead of prompting them to provide the plural or past tense of novel nouns or verbs as Berko did, we asked children to choose which of the two informants—the one who gave the regular form or the other who gave an irregular form—was “saying the right thing.” Importantly, the informant who had correctly labeled the familiar objects during the reliability induction phase always provided an *irregular* form (e.g., *one cra/two cray*), whereas the informant who had incorrectly labeled the familiar objects always provided the *regular* form (e.g., *one cra/two cras*).

All the irregular forms for both plural and past tense involved a vowel change, such as *cra/cray* (used as a noun) and *stow/sty* (used as a verb). This is similar to vowel change plural and past tense forms, such as *mouse/mice* and *fly/flew*, in which a change in the vowel is the only indicator of a change in number for nouns and tense for verbs. With respect to our novel verbs (*pim/pame*, *bing/bung*, *stow/sty*, *chay/choy*), the irregular past tense forms fit under Bybee and Slobin's (1982) Classes VI, VII, and VIII. Their Classes VI and VII verbs undergo an internal vowel change (Class VI is specifically /I/ to /æ/ or /ʌ/) and their Class VIII verbs end in a diphthongal vowel such as the /uw/ in *blew* and *flew*. For the most part, our choice of novel irregular processes was such that the present/past pairs would not rhyme with existing English present/irregular past pairs. This was done in order to control for different amounts of exposure to the various irregular past tense forms. The same holds for plurals, where our choices intentionally did not involve processes that would rhyme with existing pairs such as *foot/feet* and *mouse/mice* (*cra/cray*, *tor/toir*, *lun/lean*, *heaf/hife*). In short, the novel irregular forms children heard in our studies were based on an existing irregular morphological process: vowel mutation. However, the specific vowel change was different from what children might well hear from caregivers in order to isolate the influence of a reliable informant on their choices.

Method

Participants—Twenty-four children participated in a single 10- to 15-min session: eight 3-year-olds ($M=3$ years 7 months, range = 3;4 to 3;10), eight 4-year-olds ($M=4;5$, range=4;2 to 4;10), and eight 5-year-olds ($M=5;6$, range = 5;2 to 5;10). Equal numbers of boys and girls participated at each age group. Children were recruited from their preschools or from a database of interested families and were primarily White and from middle-class backgrounds. Seven additional children were tested, but their data were not included due to distraction and/or interruption at the preschool (3) or failure on the catch trials (4; see below).

Design—All children participated in five trial blocks: (a) reliability induction trials, (b) novel label trials, (c) novel plural trials, (d) novel past tense trials, and (e) catch trials.

Materials—Color photographs of four familiar artifacts (shoe, telephone, teacup, and airplane) and four novel artifacts (garlic press, strainer, holepunch, and micrometer) were obtained from a digital library of photo objects (Hemera Technologies, Gatineau, Canada). The photos ranged in size from approximately 2 × 4 in. to 5 × 6 in., and each was printed onto its own 8.5 × 11 in. piece of paper.

In addition, color drawings representing four novel creatures and four novel actions were selected from those originally used in Berko's (1958) *wug* test. Each creature was approximately 2.5 × 2.5 in. and was printed at the top of an 8.5 × 11 in. piece of paper. Beneath each creature were two identical copies of the same creature. The drawings of the actions were approximately 4 × 6 in. each and showed a man performing a novel action (Table 1). These were also printed onto 8.5 × 11 in. pieces of paper.

Finally, four additional photos were obtained and printed from the photo-object library. Two were used in catch trials (described below): a photo of a preschool-aged girl smiling broadly and a photo of a golden retriever printed atop the page with two identical golden retrievers printed below. The other two photos were of the informants: two adult women, one with black hair and one with blonde hair. These photos were approximately 3 × 3 in.

Procedure—Children were seen individually in a quiet location at their preschool or in the lab. They sat at a small table with the researcher either next to them or across from them. Each session began with the researcher introducing the photos of the two women who played the role of informants: “Here’s a picture of my friend Sara, and here’s a picture of my friend Ellie. They’re both grown-ups just like your mom.” Whether the blonde-haired woman was called Sara or Ellie was counterbalanced across participants. Sara was always placed on the child’s right and Ellie was always placed on the child’s left. The researcher explained that the child would be playing a game where the two informants would provide information about some pictures and the child’s task was to decide “who is saying the right thing.” The researcher then placed the stack of stimulus pictures between the photos of Sara and Ellie.

Reliability induction—The first four trials involved photos of familiar objects and were designed to allow children to learn which of the two informants was a reliable labeler. On each trial, the researcher showed one of the objects and explained that one of the women called it by one name and the other called it by a different name. For example, on showing the picture of a shoe, she said, “This friend (pointing to the reliable informant) says it’s called a shoe, and this friend (pointing to the unreliable informant) says it’s called an airplane. Which one of my friends is saying the right thing?” Table 1 shows the labels given to each object and the order in which the objects were shown. Across the four trials, the researcher always indicated that the same informant (either Sara or Ellie, counterbalanced across children) provided the correct labels. In what follows, we will refer to this individual as the “reliable informant.” For half of the children in each age group, the label used by the reliable informant was given first on the first and fourth trials and second on the second and third trials; for the other half, this was reversed. In this phase only, children were to be corrected on any trial on which they failed to accurately indicate which informant was correct. However, no child required correction.

Novel label trials—Immediately after the reliability induction phase, and without commenting on the change in type of stimulus, the researcher administered four novel label trials. The procedure was exactly the same as in the reliability induction phase, except that rather than presenting photos of familiar objects, the researcher presented photos of novel objects. For example, on showing the picture of the garlic press, the researcher said, “This friend (pointing to one informant) says it’s called a blicket, and this friend (pointing to the

other informant) says it's called a wug. Which one of my friends is saying the right thing?" Table 1 shows the labels given to each object and the order in which the novel objects were shown. For half of the children in each age group, the novel label used by the previously reliable informant was given first on the first and fourth trials and second on the other two trials; for the other half, this was reversed.

Novel plural and novel past tense trials—Children next participated in a block of four novel plural trials and a block of four novel past tense trials, counterbalanced so that approximately half had the plural before past tense and the other half had the reverse. As in the reliability induction and novel label trials, a truth-value judgment task was used. However, the wording of the task was changed in order to be appropriate for morphology.

On each of the four plural trials, as the researcher showed a picture of a novel creature, she provided its name, pointed to the pair of identical creatures printed beneath it, and explained how each informant referred to the pair. For example, "This is a cra. Can you say cra? Now there is another one. This friend (pointing to the formerly unreliable informant) says there are two cras, and this friend (pointing to the formerly reliable informant) says there are two cray. Which one of my friends is saying the right thing?"

On each of the four past tense trials, as the researcher showed a picture of a man performing a novel action, she provided the infinitive form of a novel verb and the same verb in the third person singular. She then explained how each informant referred to the activity in the past tense. For example, "This is a man who knows how to pim. Can you say pim? He pims every day. This friend (pointing to the formerly unreliable informant) says that yesterday, this man pimmied. This friend (pointing to the formerly reliable informant) says that yesterday, this man pame. Which one of my friends is saying the right thing?"

Crucially, the formerly reliable informant always provided the irregular form of the plural and past tense and the formerly unreliable informant always provided the regular form (Table 1). Thus, an expectation about regularity was pitted against previous reliability. For half of the children in each age group, the formerly reliable informant's irregular plural or past tense form was given first on the first and fourth trials and second on the other two trials; for the other half of the children, this was reversed.

Catch trials—Children might begin the session by carefully evaluating the labels or forms given by both informants. Later, they might develop a response bias where they always choose the same individual, or where they lose interest, choosing one informant or the other without paying attention to what each one said. As a check against this, we included two catch trials at the end of the session.

The first catch trial shared the format of the novel plural trials. The researcher introduced a picture of a dog and called it *a dog*. She then pointed to the two identical dogs printed beneath it and indicated that the formerly reliable informant referred to them as *two dag* and the formerly unreliable informant referred to them as *two dogs*. As in the earlier test trials, children had to choose which of the informants was saying the right thing. The second catch trial shared the format of the novel past tense trials. The researcher introduced a picture of a young girl smiling and described her as "a girl who smiles every day." She explained that the formerly unreliable informant said that yesterday the girl *smale* and the formerly reliable informant said that yesterday the girl *smiled*. Children had to choose which of the two informants was saying the right thing. To be included in the final sample, children had to choose the formerly unreliable informant on the plural catch trial (*two dogs*) and the formerly reliable one on the past tense catch trial (*smiled*). Four children (two 3-year-olds

and two 4-year-olds) responded incorrectly on one or both catch trials and were excluded from the final sample.

Results and Discussion

Preliminary analyses revealed no effects or interactions involving gender; subsequent analyses collapsed across this factor. Figure 1 shows the number of times (out of four) that children chose the novel labels and irregular plural and past tense forms given by the informant who had earlier labeled familiar objects correctly. As the figure shows, there was a striking effect of the type of information being provided (i.e., labels, plural, or past tense) on whether children endorsed the reliable labeler.

Consistent with a good deal of recent research, children endorsed the names of novel objects given by a previously reliable labeler over those given by a previously unreliable one (e.g., Jaswal & Neely, 2006; Koenig et al., 2004; Koenig & Harris, 2005a). As Figure 1 shows, children at all ages endorsed the novel labels given by the previously reliable labeler at least 72% of the time. Even on the first novel label trial, 17 of 24 children (71%) endorsed the novel label given by the previously reliable labeler. Our procedure differs slightly from the earlier studies investigating reliability in that the children did not actually hear each informant give testimony during the reliability induction trials or any of the test trials. Rather, the researcher simply pointed to photographs of the two informants, reported what each one said, and children had to decide which of the two was saying the right thing. Despite this difference in procedure, children had a clear preference for the formerly reliable informant's novel labels.

The preference for the formerly reliable informant did not carry over to the novel plural or past tense trials, however. On these trials, the researcher reported that the formerly unreliable informant used regular forms (e.g., “two cras” or “yesterday, he binged”) and the formerly reliable informant used irregular forms (e.g., “two cray” or “yesterday, he bung”). When asked to decide who was saying the right thing, children overwhelmingly indicated the formerly unreliable speaker who always provided the regular forms. They endorsed the formerly reliable labeler's irregular plural or past tense forms at most 23% of the time.

As Diesendruck and Markson (2001) pointed out, it is important to consider how children respond on the first trial of a particular task because responses on the first trial are not influenced by feedback that children might receive (or think that they are receiving; see also Evey & Merriman, 1998). Recall that we counter-balanced the order of the novel plural and novel past tense trial blocks so that approximately half the children received the novel plural trials first and half received the novel past tense trials first. Considering just the first trial of whichever of these two blocks came first, only 1 of 24 children (4%) endorsed the irregular plural or past tense form provided by the formerly reliable informant.

This reversal of which person children chose to endorse is particularly striking considering that most children had endorsed information from the formerly reliable informant on at least seven of the eight previous trials. That is, children endorsed the reliable informant's labels on all four of the reliability induction trials and, on average, on three of the four novel label trials. Endorsing information provided by the unreliable informant required children not only to ignore the incompetence that person had shown in labeling but also to break the response set developed over the course of the first eight trials. Clearly, a preference for regularity in morphology trumped any expectation about the competence of an informant formed on the basis of her reliability in labeling.

A 3×3 mixed analysis of variance (ANOVA; Age x Trial Type) on the number of times children endorsed the formerly reliable informant confirmed that children were more likely

to endorse her novel labels than her novel irregular plural or past tense forms, $F(2, 42) = 85.76$, $p < .001$. There was no effect of age and no interaction, $F_s < 1.80$, indicating that this preference for the previously reliable labeler on the novel label trials and for the previously unreliable labeler on the novel plural and past tense trials held across 3-, 4-, and 5-year-olds.

Although the omnibus analysis showed no differences between the three age groups, comparisons against chance suggested that younger children's preferences may have been slightly less robust than older children's. Five-year-olds preferred the previously reliable informant on the novel label trials and the previously unreliable one on the plural and past tense trials significantly more often than would be expected by chance, $t_s > 3.04$, $p_s < .05$. But younger children's preferences were occasionally only marginally different from chance. On novel label trials, 3- and 4-year-olds were marginally more likely than chance to prefer the formerly reliable informant's labels, $t(7) = 1.99$, $p = .09$, and $t(7) = 2.20$, $p = .06$, respectively. On novel plural trials, 3-year-olds were significantly more likely than chance to prefer the formerly unreliable informant's regular plural forms, $t(7) = 2.83$, $p < .05$, and 4-year-olds always did so. Finally, on novel past tense trials, 3-year-olds were marginally more likely to prefer the formerly unreliable informant's regular past tense forms, $t(7) = 2.11$, $p = .07$, whereas 4-year-olds always did so. Given that chance comparisons were all at least marginally different from chance and given the lack of any age effect or interaction in the omnibus ANOVA, we are hesitant to make too much of these age differences. However, it is worth noting that other researchers have suggested that younger children may not make as efficient use of information about reliability as older children (Clément et al., 2004; Harris et al., in press; Koenig et al., 2004; Koenig & Harris, 2005a, 2005b).

In Study 1, we used labeling as a means of inducing an expectation about reliability because children have been shown to prefer a reliable labeler's novel labels (e.g., Clément et al., 2004; Jaswal & Neely, 2006; Koenig et al., 2004) and functions (Koenig & Harris, 2005a). It is possible, however, that expectations about who is a reliable informant do not extend from labeling to morphology. If this were the case, children might be more likely to endorse irregular morphology if it were provided by an informant who had previously been shown to be a reliable "morphologist." Study 2 addresses this possibility and also considers whether children would expect a reliable morphologist to be a good source of information about novel labels.

Study 2

In Study 2, our reliability induction phase involved familiar nouns that take the regular plural ending. For example, the reliable informant correctly indicated that the plural of *dog* was *dogs*, whereas the unreliable informant indicated that the plural of *dog* was *dag*. We chose to use the regular process to induce reliability for two reasons. First, we wanted to ensure that children would know the correct plural form of the nouns used in the reliability induction phase. Ramscar and Yarlett (2007, Study 1) found that 3- to 5-year-old children recognized the correct form of irregular plurals (and rejected overregularized forms) just 66% of the time (see also Cox, 1989; Kuczaj, 1978). Thus, if we had used familiar irregular nouns during the reliability induction phase, children would not consistently have been able to recognize the correct irregular forms and so we would have had to offer frequent correction. Second, we wanted to provide positive evidence to the children that the reliable informant knew about and could use the regular form so that they could not attribute her failure to use regular forms in the test trials to ignorance about regularity. Following the reliability induction trials, children participated in the same novel label, novel plural, and novel past tense trials used in Study 1.

Method

Participants—Twenty-four children participated in a single 10- to 15-minute session: seven 3-year-olds ($M = 3$ years 5 months, range = 3;1 to 3;10), ten 4-year-olds ($M = 4;5$, range = 4;0 to 4;11), and seven 5-year-olds ($M = 5;4$, range = 5;0 to 5;9). Approximately equal numbers of boys and girls participated at each age group. Children were recruited from a database of interested families and were primarily White and from middle-class backgrounds. None had participated in Study 1. Eleven additional children were tested, but their data were not included due to experimenter error (3), failure to cooperate (1), or failure on the catch trials (7; see below).

Design—The design was the same as in Study 1.

Materials—The same photos of novel artifacts and the same drawings of novel creatures and novel actions from Berko's (1958) *wug* test used in Study 1 were used here. Additionally, the photos of the two informants (the woman with black hair and the woman with blonde hair) used in Study 1 were used here. We replaced the name "Sara" from Study 1 with "Jane" in the current study because one of the researchers running the study was named "Sarah" and we wanted to eliminate the potential for confusion.

In addition, four additional familiar objects were obtained from the photo-object library (dog, cow, sock, and spoon) for use in the reliability induction phase. Each was approximately 2.5×2.5 in. and printed at the top of an 8.5×11 in. piece of paper. Beneath each object were two identical copies of the same object. Finally, photos of two additional familiar objects (shoe and telephone) were used in the catch trials (described below). These photos were approximately 2×4 in.

Procedure—Children were seen individually in the lab. The procedure was very similar to that used in Study 1: Children participated in reliability induction trials, novel label trials, novel plural trials, novel past tense trials, and catch trials. The only differences from Study 1 were in the reliability induction trials and the catch trials.

In the reliability induction trials, reliability was induced by reporting that one informant used the correct (regular) plural forms of four familiar nouns and the other informant used incorrect (and irregular) plural forms of the same nouns. For example, as the researcher showed the stimulus with one dog at the top and two identical dogs below, she explained, "This is a dog. Can you say dog? Now there is another one. This friend (pointing to the reliable informant) says there are two dogs. This friend (pointing to the unreliable informant) says there are two dag. Which one of my friends is saying the right thing?" Table 1 shows the forms used by each informant and the order in which the trials took place.

As in Study 1, across the four reliability induction trials, the researcher always indicated that the same informant (either Jane or Ellie, counterbalanced across children) provided the correct regular form. Also like Study 1, for about half of the children in each age group, the form used by the reliable informant was given first on the first and fourth trials and second on the second and third trials; for the other half, this was reversed. In this phase only, children were corrected on any trial on which they failed to accurately indicate which informant was correct. Unlike Study 1 where no children required correction about the names of familiar objects, eight children included in the final sample required correction about the regular plural form of a familiar noun: four 3-year-olds and three 4-year-olds required correction on one of the four induction trials and one 4-year-old required correction twice.

Following the reliability induction trials, children participated in the same novel label, novel plural, and novel past tense trials as in Study 1. Finally, they were given two catch trials to ensure that they had paid attention throughout the procedure. On the first catch trial, the researcher introduced a picture of a shoe and explained that the previously unreliable informant referred to it as *a shoe* and the reliable one referred to it as *an airplane*. On the second catch trial, the researcher introduced a picture of a telephone and explained that the previously reliable informant called it *a telephone* and the previously unreliable one called it *a glass*. Children had to indicate which informant was saying the right thing. As in Study 1, to be included in the final sample, they needed to respond correctly to both of these catch trials. Seven children (six 3-year-olds and one 5-year-old) did not respond correctly on one or both catch trials and so were excluded from the final sample. Note that the large number of 3-year-olds who failed the catch trials limits somewhat the conclusions that can be drawn about 3-year-olds relative to the conclusions that can be drawn about the older children.

Results and Discussion

As Figure 2 shows, the pattern of results was the same as in Study 1. Children at all ages endorsed the novel labels provided by the previously reliable informant at least 75% of the time, at each age above what would be expected by chance, $t_s > 2.34$, $p_s < .05$. On the very first novel label trial, 18 of 24 children (75%) endorsed the novel label provided by the previously reliable informant. Thus, even though reliability was induced through regular plural morphology rather than labeling, children had a preference for novel labels provided by the previously reliable informant. However, when it came to plural and past tense test trials, and as in Study 1, children rarely endorsed the irregular forms provided by the previously reliable informant. They did so at most 18% of the time, less frequently than would be expected by chance at each age, $t > 2.75$, $p < .05$. On the first novel plural or past tense trial, just 2 of 24 children (8%) endorsed the irregular plural or past tense form from the formerly reliable informant. They clearly preferred the regular forms, even though they had been provided by the formerly unreliable morphologist.

A 3×3 mixed ANOVA (Age $\times$ Trial Type) on the number of trials on which children endorsed the formerly reliable morphologist confirmed that they were more likely to endorse her novel labels than her novel irregular plural or past tense forms, $F(2, 42) = 58.88$, $p < .001$. There was no effect of age and no interaction, $F_s < 1$, indicating that as in Study 1, this pattern of results held across all three age groups.

General Discussion

These two studies investigated whether an informant's history of reliability influences children's expectations about morphology. In Study 1, children endorsed novel labels from a previously reliable labeler, but they did not endorse the irregular plural or past tense forms of novel nouns or verbs she provided. Instead, they favored the regular forms of those words, which were provided by the formerly unreliable labeler. In Study 2, children endorsed novel labels from a previously reliable morphologist. But they overwhelmingly preferred regular plural and past tense forms of novel words even though these were provided by a previously unreliable morphologist.

These results are noteworthy for several reasons. First, they show that English-speaking children are more likely to use an informant's history of reliability when learning what something is called than when learning how to express the plural or past tense of a new word. One important difference between labels and morphology is that children had no expectations about the names of the novel objects used in the present studies: the micrometer could just as well have been called *a dawnoo* as *a nez*. In contrast, they did have implicit expectations about how to express the plural and past tense. If asked to generate the

plural of *cra* themselves, they would spontaneously say *cras* rather than *cray*; if asked to generate the past tense of *bing*, they would say *binged* rather than *bung* (Berko, 1958). One possibility, then, is that our findings reflect a general tendency for children to ignore input that conflicts with their expectations.

For example, children sometimes object when a speaker refers to a familiar object with a novel name, possibly because this conflicts with a default expectation they have that each object has only one label (e.g., Macnamara, 1982; Markman, 1989; Merriman & Bowman, 1989). They also sometimes object when a speaker refers to an object that looks like it belongs to one familiar category with the label of a different familiar category—when a speaker refers to a cat-like animal as *a dog*, for example (Jaswal, 2004; Koenig & Echols, 2003; Pea, 1982; but see Gelman & Markman, 1986; Jaswal & Markman, 2007). Preschoolers will even resist a message about the contents of a container if the speaker is less informed than they themselves are (Robinson, Champion, & Mitchell, 1999).

Unlike the current work, these previous studies were not designed to investigate whether a speaker's history of reliability would play a role in children's willingness to defer to input that conflicts with their expectations. Results from one study that has considered this issue are consistent with our findings. Clément et al. (2004) found that 3- and 4-year-olds tended to disregard testimony that contradicted their own first-hand observation, even when that testimony came from a formerly reliable informant. In that study, children saw, for example, a red pompon and heard the formerly reliable informant describe it as *blue* and the formerly unreliable one describe it as *yellow*. When the children were asked about its color, most responded with its actual color.

It is important to point out, however, that Clément et al. (2004) investigated how children would respond to testimony that conflicted with knowledge obtained through first-hand observation. In the studies reported here, in contrast, the formerly reliable informant's testimony conflicted with implicit expectations children had about how to form the plural and past tense; first-hand observation was not involved. Furthermore, whereas the formerly reliable informant in Clément et al.'s study provided false testimony about the color of an object (e.g., referred to a red pompon as *blue*), the formerly reliable informant in the present studies provided testimony about the plural or past tense of a novel word that could very well be correct. Indeed, we know that children must be receptive to irregular forms because they do learn exceptions to the regular paradigms. Although they occasionally make overregularization errors—saying *mouses*, for example, or *breaked*—they do learn that the conventional way to express the plural of *mouse* is *mice* and the past tense of *break* is *broke*. Thus, although they certainly have expectations about regularity, their resistance to even entertaining the possibility that the reliable speaker's irregular forms were correct is quite surprising.

A second reason our results are noteworthy is that they show that children can form expectations about who is a good source of labels on the basis of something other than a history of reliable labeling. In previous studies, reliability has been induced by having one informant accurately label the familiar objects and a second informant inaccurately label the same objects (Clément et al., 2004; Jaswal & Neely, 2006; Koenig et al., 2004) or indicate ignorance about their names (Koenig & Harris, 2005a). Study 2 showed that 3- to 5-year-olds expected that an informant who provided the correct plural form of familiar nouns would be a better source of novel labels than an informant who provided the incorrect plural form of the same nouns.

A third important aspect of this work is methodological: Previous research investigating reliability has provided conflicting testimony from two speakers by using actors who appear

on videotape (e.g., Jaswal & Neely, 2006; Koenig et al., 2004) or puppets (Clément et al., 2004). The present study, in contrast, used what might be called a “hearsay” procedure in which the researcher simply reported on what each of two pictured informants said. Results from the novel label trials replicated the findings from the more traditional tasks: Children endorsed the novel labels from the formerly reliable speaker even though they never actually heard her produce any labels herself.

One objection to our conclusion that an informant's past reliability does not play an important role in how English-speaking children interpret input about the plural and past tense could be that we did not provide a test of how children would respond if the formerly reliable speaker provided the *regular* forms and the formerly unreliable one provided the *irregular* forms. That is, perhaps children in the present studies were more likely to endorse the irregular forms provided by the formerly reliable speaker than they would have been if the same forms had been provided by the formerly unreliable one. Although we cannot rule out this possibility, we think it is unlikely that this alternative manipulation would have produced results that differed from those presented here because children in our studies were already so unlikely to endorse the irregular forms. Across Studies 1 and 2, and as Figures 1 and 2 show, 3-year-olds endorsed the irregular forms 11% – 23% of the time, 4-year-olds did so 0% – 18% of the time, and 5-year-olds did so 0% – 11% of the time. Further, on the very first trial where an irregular plural or past tense form was provided by the formerly reliable informant, just 1 of 24 children in Study 1 and 2 of 24 in Study 2 endorsed that form. It is unlikely that an alternative manipulation with pre-schoolers would produce responses much closer to zero.

Another objection to our conclusion that children overwhelmingly preferred the regular forms of novel nouns and verbs is that perhaps our findings reflected a response bias developed over the course of the study. Two pieces of evidence argue against this possibility: First, as described above, the preference for the regular form offered by the formerly unreliable informant (and against the irregular form offered the formerly reliable informant) was present from the very first novel plural or past tense trial; this preference was opposite from the preference children had shown on the immediately preceding novel label trials. Second, we included two catch trials at the end of the session. To be included in the final sample, children had to select the formerly reliable informant once and the formerly unreliable informant once. This served as a means of ensuring that our sample included only those children who considered what each informant was alleged to have said before responding.

One important question for future work concerns the circumstances under which children would endorse irregular forms. Previous work using familiar nouns and verbs has found that the more tokens of a given irregular word children hear, the less likely they are to commit an overregularization error involving that word (e.g., Maslen, Theakston, Lieven, & Tomasello, 2004; Nicoladis, Palmer, & Marentette, 2007). Note that these previous studies focus on the likelihood that children *produce* the correct form, which requires not only that they have accepted that an irregular form applies but also that they subsequently remember that form. Our interest, in contrast, was in the first step only—namely, the likelihood that they would even entertain the possibility that a given word could take an irregular form and whether this would be influenced by past reliability. Still, it would be interesting to investigate whether a higher ratio of irregular tokens to regular ones would make it more likely that children would endorse the irregular form rather than the regular one. For example, if they had heard several informants provide the irregular form, and only one provide the regular form, they might favor the irregular form.

Children might also be more amenable to endorsing an irregular form if the procedure had involved a single informant who provided that form rather than one informant who provided the irregular form and another who provided the regular one. We chose to pit two informants against each other in order to be consistent with previous work investigating children's sensitivity to reliability (e.g., Clément et al., 2004; Harris et al., in press; Jaswal & Neely, 2006; Koenig et al., 2004; Koenig & Harris, 2005a). But because the regular form was consistent with children's expectations, hearing another person produce it—even though that person had not been reliable in the past—may have been taken as confirmation that children's intuitions were correct. Thus, it would be interesting to develop a procedure that compared endorsement of an irregular form from a single reliable or single unreliable speaker.

Endorsements of the irregular forms might also increase if reliability could be induced using familiar irregular morphology. As noted earlier, we deliberately chose to use familiar regular (rather than irregular) morphology in Study 2 for two reasons: First, we wanted to provide children with positive evidence that the reliable informant could use the regular process and so was choosing not to use it during the test phases. Second, and perhaps more importantly, preschool-aged children have only a tenuous grasp of familiar irregular words (e.g., Cox, 1989; Kuczaj, 1978; Ramscar & Yarlett, 2007). Any procedure that attempts to induce reliability using irregular morphology will necessarily involve frequent correction during the induction phase. (Note that even using familiar regular plural forms in the induction phase of Study 2, we had to offer correction on at least one of the four induction trials to about one third of our participants. No such correction was required in Study 1 when the induction trials involved familiar labels.) Thus, instead of figuring out on their own which of the two informants is giving accurate information, children will essentially be given testimony to this effect by the experimenter. Children's ability to make use of testimony about someone else's reliability is an interesting question in its own right, but it is a separate one from their own ability to generate expectations about reliability.

Finally, one might argue that children would have been more receptive to irregular forms had they sounded more like familiar irregular ones. For example, if we had used *fouse/fice* (analogous to *mouse/mice*) or *tiv/tave* (analogous to *give/gave*), children might have been more likely to endorse the irregular form over the regular one. There are three difficulties with using words that rhyme in this way. First, our interest was in investigating the scope of expectations about reliability and so we endeavored to factor out individual children's familiarity with the particular processes used. The most straightforward way to do this was to use vowel changes that differed from what children had previously encountered. The vowel change process itself is ubiquitous among irregular past tense formations: Six of Bybee and Slobin's (1982) eight classes of irregular plurals involve vowel mutations. We assume, then, that vowel change as a means of marking past tense was familiar to children but that the particular changes we used were not. The same comments apply to irregular plurals, though the vowel change process—as in *mouse/mice*, *man/men*, and *foot/feet*—is one of many types of irregular plural formations that can apply.

A second reason using familiar processes is problematic is that they are idiosyncratic. For example, the /I/ → /æ/ of *drink/drunk* and *sink/sank* fails to extend to *think/thought*. Likewise, *write/wrote* does not extend to *bite/bit* and *make/made* does not extend to *take/took*. Idiosyncrasies also apply to plurals where, for example, *goose/geese* does not extend to *moose/moose* and *mouse/mice* does not extend to *house/houses*. Thus, it is not clear which novel irregulars that rhyme with familiar ones would be more acceptable to children in our task.

Finally, and closely related to the last point, is the problem of which irregular pattern to choose in creating novel stimuli. As mentioned above, Bybee and Slobin (1982) classified the 90 irregular verbs used in their study into eight classes. Huddleston and Pullum (2002) organize 176 irregular preterite (past tense) and past participle forms into four major classes, with five to eight subclasses per class for a total of 25 categories. Choice of patterns for stimuli could be based on number of members in a given class, the token frequency of the past tense form in adult speech, or the token frequency in child-directed speech. We leave this for future research.

In the lively literature on the acquisition of the English plural and past tense (e.g., Marcus, 1996; Pinker, 1999; Plunkett & Marchman, 1993; Rumelhart & McClelland, 1986), one issue that has been overlooked is how children make sense of input that suggests that a particular word takes an irregular form. Xu and Pinker (1995) suggest that “children master irregular forms quite accurately, presumably because irregular forms are just a special case of the arbitrary sound-meaning pairings that define words, and because children are good at learning words” (p. 531). The two studies presented here point to an important difference between word learning and the learning of irregular forms: Whereas an informant's history of reliability can influence the uptake of novel labels, it does not appear to influence the uptake of irregular morphology.

Acknowledgments

The research was supported by National Institute of Child Health and Human Development Grant HD-053403 to V.K.J. We thank the children, parents, and teachers who participated in these studies. Thanks also to Christin Chambers and Sarah Puckett for assistance in collecting and coding data and to Eve Clark for helpful comments on a previous draft.

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Figure 1.

Average number of times (out of four) children endorsed the information given by formerly reliable labeler (Study 1).

Note. Error bars show standard error of the mean.

Chance comparisons: [†] $p < .10$. ^{*} $p < .05$.

Figure 2.

Average number of times (out of four) children endorsed the information given by formerly reliable morphologist (Study 2).

Note. Error bars show standard error of the mean.

Chance comparisons: * $p < .05$.

Table 1
Stimuli Used and Vocabulary Provided by Reliable and Unreliable Speakers in Studies 1 and 2

	Study 1			Study 2		
	Object/action	Reliable speaker	Unreliable speaker	Object/action	Reliable speaker	Unreliable speaker
Reliability induction	Shoe	Shoe	Airplane	Dog	Dogs	Dag
	Telephone	Telephone	Glass	Cow	Cows	Coy
	Teacup	Teacup	Shoe	Sock	Socks	Sike
	Airplane	Airplane	Telephone	Spoon	Spoons	Spane
Novel labels	Garlic press	Wug	Blicket	(Same as Study 1)		
	Strainer	Jeter	Dax			
	Hole punch	Clerf	Mandoh			
	Micrometer	Dawnoo	Nez			
Novel plurals ^a	Cra	Cray	Cras	(Same as Study 1)		
	Tor	Toir	Tors			
	Lun	Lean	Luns			
	Heaf	Hife	Heafs			
Novel past tense ^a	Bing ^b	Bung	Binged	(Same as Study 1)		
	Stow	Sty	Stowed			
	Pim	Pame	Pimmed			
	Chay	Choy	Chayed			
Catch trials	Dog	Dag	Dogs	Shoe	Airplane	Shoe
	Smile	Smiled	Smale	Telephone	Telephone	Glass

^aNovel plural and past tense pictures and vocabulary adapted from Berko (1958).

^bDepicted actions: Bing = man walking on ceiling; stow = man walking with a teapot on his head; pim = man swinging spiky ball around; chay = man doing trick with yo-yo.