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Brief Report

On the malleability of selective trust

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ABSTRACT

Although much research has explored the cues that young children use to determine informant credibility, little research has examined whether credibility judgments can change over time as a function of children's language environment. This study explored whether changes in the syntactic complexity of adults' testimony shifts 4- and 5-year-old children's ($N = 42$) credibility and learning judgments. Children from lower-socioeconomic status (SES) backgrounds were randomly assigned to hear a high proportion of complex language (the passive voice) or simpler language (the active voice) during 10 days of book-reading interactions with adult experimenters. Before and after the book-reading sessions, children's learning preferences for informants who used passive versus active voice were measured. Exposure to the complex passive voice led children to use syntactic complexity as a cue to make inferences about who to learn from, whereas active voice exposure resulted in no such shift. Implications for the role of the language environment in children's selective trust are discussed.

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Introduction

By early childhood, children systematically track a variety of cues from adults when deciding who to trust and learn from (Harris, Koenig, Corriveau, & Jaswal, 2018). Four-year-old children prefer to learn new information from adults who belong to the same social group (e.g., Corriveau & Harris, 2009a; Harris & Corriveau, 2011; Kinzler, Corriveau, & Harris, 2011) and whose testimony is accurate (e.g., Birch, Vauthier, & Bloom, 2008; Corriveau & Harris, 2009a, 2009b; Fusaro, Corriveau, & Harris, 2011; Jaswal & Neely, 2006; Koenig & Harris, 2005; Sobel & Macris, 2013) and syntactically complex (Corriveau, Kurkul, & Arunachalam, 2016).

A tacit assumption from this literature is that credibility judgments are stable. Indeed, preschool-aged children maintain their preference to learn from an accurate informant over delays of at least a week (Barth, Bhandari, Garcia, MacDonald, & Chase, 2014; Corriveau & Harris, 2009b). However, in many cases children update their learning preferences after new experiences with an informant; for example, children trust an informant who speaks sincerely over one who jokes, basing their judgment on the informant's current behavior over his or her past behavior (Hoicka, Butcher, Malla, & Harris, 2017; see also Ronfard & Lane, 2018, and Scofield & Behrend, 2008, for similar adjustments based on inaccuracy). Therefore, children are aware that over time an informant may display cues indicating that he or she is more or less credible. But what happens when a cue to credibility—irrespective of the informant—changes? That is, can children not only change their trust in a particular informant (Hoicka et al., 2017; Ronfard & Lane, 2018; Scofield & Behrend, 2008) but also change their trust in the cue?

Indeed, there are many examples in children's everyday lives when a particular cue to credibility changes. A relevant example that motivated the current study concerns the often abrupt introduction of various linguistic cues to credibility when 5-year-old children enter formal schooling. Children experience a shift from more casual linguistic registers in the home to a more academic register in the school environment, the latter of which is characterized by greater syntactic complexity and sophistication of vocabulary use (e.g., Snow, 2010; van Kleeck, 2014). Critically, this shift is stronger among children from lower-socioeconomic status (SES) backgrounds whose home language environments, on average, differ more sharply from the language environment of school (Hart & Risley, 1995). In the current study, we investigated this issue with an experimental framework by asking whether lower-SES preschool-aged children's credibility judgments shift in response to systematic manipulations to the syntactic complexity of adult testimony.

We used the passive versus active voice as a test case of the syntactic complexity of testimony because previous work has shown that children are sensitive to syntactic complexity when making credibility judgments (Corriveau et al., 2016). Critically, both the passive and active voices communicate the same informational content but differ in syntactic complexity. Compared with the active voice in which the agent is labeled in the first noun phrase ("*The boy* chased the dog"), the more complex passive voice structure places the agent in a noncanonical position in an optional prepositional phrase ("The dog was chased by *the boy*") (Bencini & Valian, 2008; Brooks & Tomasello, 1999; Crain, Thornton, & Murasugi, 2009; Gordon & Chafetz, 1990; Harris & Flora, 1982).

Corriveau et al. (2016) found that children's preference to learn from informants who used active versus passive voice differed by SES. In their study, 4- and 5-year-old children from either higher- or lower-SES backgrounds were provided with testimony from two adults in the form of descriptions of pictures. One adult consistently used the passive voice to describe the pictures (e.g., "The dog is washed by the boy"), whereas the other adult consistently used the active voice (e.g., "The boy washed up his pet dog"). Then both adults provided novel labels for novel objects and actions (the testimony of which did not contain markers of the passive vs. active voice), and children were asked to choose which informant to learn from. Whereas children from higher-SES backgrounds chose to learn from informants who had previously used the more complex passive voice testimony over the simpler active voice testimony, children from lower-SES backgrounds did not show this preference. Importantly, SES differences in selective trust remained even after controlling for children's passive voice comprehension (see Vasilyeva, Huttenlocher, & Waterfall, 2006, for similar findings; see Pruitt, Oetting, & Hegarty, 2011, for SES differences in production of passives).

In the current study, we recruited children from lower-SES backgrounds to examine whether selective learning preferences would change with increased exposure to testimony containing the passive voice. This question is motivated by accumulating evidence that variations in testimony, or the language environment to which children are exposed, helps to explain SES differences in syntactic development (e.g., Golinkoff, Hoff, Rowe, Tamis-LeMonda, & Hirsh-Pasek, 2018; Huttenlocher, Waterfall, Vasilyeva, Vevea, & Hedges, 2010; Leech, Rowe, & Huang, 2017). For example, although the passive voice is rare in child-directed speech (e.g., Gordon & Chafetz, 1990), higher-SES caregivers use more syntactically complex language (e.g., "wh-" questions, relative clauses) when speaking with children, and these variations help to explain some of the SES differences in children's syntactic skills (e.g., Hoff, 2003; Huttenlocher, Vasilyeva, Cymerman, & Levine, 2002; Huttenlocher, Vasilyeva, Waterfall, Vevea, & Hedges, 2007; Huttenlocher et al., 2010). These findings raise the question of testimony's role in children's selective trust judgments.

Previous research has found that increasing lower-SES children's exposure to testimony containing passive voice constructions during shared book reading increased the children's comprehension and production of the passive voice (Vasilyeva et al., 2006). In the current study, we asked whether variations in exposure to syntactically complex testimony would also modify lower-SES children's selective trust judgments. To test this hypothesis, we exposed preschool-aged children to either syntactically complex testimony (i.e., larger proportion of passive voice constructions) or syntactically simple testimony (i.e., no instances of the passive voice construction) from an experimenter during 10 days of shared book reading. To explore whether the syntactic complexity of the testimony affected children's inferences about the credibility of an informant, children's endorsements of informants who previously used the active or passive voice were measured before and after the book-reading phase. Note that as in Corriveau et al. (2016), children's credibility judgments were made in the absence of cues to syntactic complexity, ensuring that we were measuring children's ability to use prior information about syntax to make inferences about the future credibility of the informants.

We anticipated one of three possible outcomes. First, consistent with some work showing stability of credibility judgments for up to 1 week (Barth et al., 2014; Corriveau & Harris, 2009b), the 10-day book-reading session might not influence children's credibility judgments. Indeed, prior research has shown that children display a selective preference to learn from a member of their own cultural group over a member of their cultural out-group (Corriveau & Harris, 2009a; Corriveau et al., 2016; Harris & Corriveau, 2011; Kinzler et al., 2011). On this hypothesis, regardless of which testimony is heard, children should selectively endorse active voice informants given that the passive voice is rare in child-directed speech and, therefore, is not an in-group feature of the language heard by any of the children. Second, children's credibility judgments might be influenced by the content of the local environmental testimony. That is, exposing children to any form of testimony might modify the likelihood that they endorse a speaker who uses that same form during future learning opportunities. On this hypothesis, children exposed to passive voice testimony should increase their subsequent preference for learning from an informant who uses passive voice, whereas children exposed to active voice testimony should increase their preference for learning from an informant who uses active voice. A third possibility is that exposing children to passive voice testimony may familiarize children to syntactically complex features that are otherwise rare in their experience. On this hypothesis, exposure to passive voice testimony during book reading might modify children's use of the passive voice as a marker of informant competence, shifting children's preference to an informant who uses passive voice, but no such shifts would be seen for children exposed to active voice testimony.

Method

Participants

Participants were 4- and 5-year-old children recruited from six child-care centers within a large metropolitan area. All children came from families who qualified for free or reduced-price lunch or subsidized child care, a proxy for family SES. To reach a sample size of at least 20 per condition, we oversampled due to expected attrition given the multiple-day book-reading session design. Initially,

28 and 24 children were randomly assigned to the passive and active voice conditions, respectively. Of these children, 10 were excluded from the final analysis (n = 2 in the active voice condition and n = 8 in the passive voice condition) because they missed 3 or more days of book reading (the inclusion standard used by Vasilyeva et al., 2006). The final sample size was 42 children (16 female and 26 male) ranging in age from 3 years 7 months to 5 years 11 months (mean age = 4 years 9 months, SD = 1 month). As compensation, participating schools received copies of the storybooks and children received a sticker. Data were collected between October 2015 and March 2016.

Materials

Children were exposed to active or passive voice testimony during 10 days of book reading. The study included three sets of researcher-developed books (average pages = 10; story length = 20–30 sentences). Each story had a simple plot (e.g., going to the zoo), had engaging pictures, and contained racially diverse characters. Stimuli were identical across conditions except for the accompanying text (see Fig. 1). Across the three stories, there were 0 occurrences of the passive voice in the active voice stimuli (0%), whereas there were 25 occurrences of the passive voice in the passive voice stimuli (36%). The passive books also had a larger number of past perfect forms than the active books, which provide additional exposure to the past participle used in the passive voice. Finally, some sentences in the passive and active books differed in the order in which the phrases or clauses occurred, but the same content was provided in both.

To measure learning preferences, children watched several video clips (Corriveau et al., 2016) displaying two English-speaking female informants, neither of whom appeared in any other phase of the experiment. During the initial preference trials, the two informants sat at a table with a picture or object between them, and one informant consistently used the passive voice while the other consistently used the active voice. During the novel morphology video clips, the informants offered different, but plausible, irregular past tense forms for a novel action portrayed in a picture (selected from Berko's (1958) *wug* test; see Corriveau et al., 2016). During the novel label videos, the informants offered different novel labels for unfamiliar objects (adapted from Corriveau et al., 2016).

Procedure

All procedures took place in a quiet area within the children's school. Children received a pretest, 10 passive or active voice book-reading sessions, and a posttest (see Table 1). The pretest and posttest consisted of four identical subphases. The first three phases (initial preference, novel label, and novel morphology trials) were used to measure implicit judgments of informant competence. A fourth phase yielded a measure of children's explicit judgment of informant competence. Phases were presented in a fixed order with the exception of the novel label and novel morphology trials, whose order was counterbalanced across participants. Participant responses were live-coded by the experimenter and scored at a later time. A second research assistant, blind to study design and hypotheses, verified the scoring (agreement = 100%).

At pretest, the experimenter introduced children to two informants in a still frame of the video clip and said, "See these two people? This one is wearing a blue shirt, and this one is wearing an orange shirt. They are going to tell you about what some people in some pictures are doing. Let's listen."

During the four *initial preference trials,* a picture of a child doing an activity (e.g., washing a dog, picking flowers) was between the two informants (adapted from Corriveau et al., 2016). One informant described pictures using the passive voice (e.g., "The dog is washed by the boy"), and the other informant described pictures using the active voice (e.g., "The boy washed up his pet dog"). Sentences were equated for number of words (therefore, there were two words in the active condition that did not appear in the passive condition, but these did not change the overall sentence meaning) (Table 2). After the video clip, the experimenter repeated the informants' picture descriptions and asked children what they would say (e.g., "The girl wearing the orange shirt said the boy washed up his pet dog, and the girl in the blue shirt said the dog is washed by the boy. What would you say?"). All questions were designed to elicit forced-choice responses from participants (i.e., whether children

Fig. 1. Example of intervention stimuli with corresponding condition language. *Active voice:* "'Look, the baby monkey is chasing the big monkey around!' shouted Danny. Danny loved to watch the monkeys chase other ones everywhere. He thought about the time when his sister chased him around the house and in the backyard." *Passive voice:* "'Look, the big monkey is being chased by the baby monkey!' shouted Danny. Danny loved watching some monkeys being chased by other ones. He had thought about the one time when he was chased around the house by his sister."

Table 1
Schematic of procedure.

Pretest phase			Experimental phase	Posttest phase		
Initial preference for passive informants	Implicit judgments: Novel labels and morphology	Explicit judgment	10 Book reading sessions with experimenter	Initial preference for passive informants	Implicit judgments: Novel labels and morphology	Explicit judgment

Table 2
Sample descriptions used in initial preference trials during pretest and posttest.

Event	Passive informant description	Active informant description
Girl with flower	The flower is picked by the girl	The little girl is picking the flower
Boy with dog	The dog is washed by the boy	The boy washed up his pet dog

endorsed the girl in the blue or orange shirt). The experimenter recorded both verbal and nonverbal (e.g., pointing) responses, and there were no instances where children did not respond.

During the four *novel label* test trials, the experimenter stated, "Now they are going to say the names of some things we have never seen before. Let's see what they say." The passive and active informants provided different novel labels for the objects. After the video clip, the experimenter restated what the informants had said—for example, "The girl in the orange shirt said this is a *toma,* and the girl in the blue shirt said this is a *mido.* What would you say?"

During the four *novel morphology* test trials, the experimenter stated, "Now these girls are going to tell you about what someone is doing." For each video clip, the experimenter labeled a picture of an action with a novel verb (e.g., "Here is a picture of a man who is *fiding.* Now I wonder what he did yesterday."). Both informants presented a plausible irregular past tense form of the verb. After the video clip was played, the experimenter restated what the informants had said—for example, "The girl wearing the blue shirt said yesterday he *fid,* and the girl wearing the orange shirt said yesterday he *fode.* What would you say?"

Finally, during the *explicit judgment* phase, the experimenter pointed to a picture of the two informants and asked, "Now, do you remember when these two people were explaining some things that children were doing like picking a flower and playing the piano? Which girl was better at explaining those things?" This question served as our measure of explicit judgment of informant competence.

After the pretest, children were randomly assigned to receive either the active or passive voice condition during which the experimenter engaged children in 10 book-reading sessions. Children were read the three books in a pseudorandom order, one book per day. Sessions were dyadic, such that only children and the experimenter read together.

After completing the book-reading phase, children were given a posttest in which they were once again presented with all four subphases of the pretest: initial preference trials, novel labels, novel morphology, and explicit judgments. Critically, the informants labeled the objects and actions in the same manner—without cues to syntactic complexity—thereby requiring children to infer from whom to learn based on the testimony provided during the book-reading phase.

Results

Preliminary analyses revealed no differences in implicit or explicit preferences by gender or age, Fs < 1.00. Therefore, subsequent analyses were collapsed across these two variables.

Our first analysis concerned children's initial preference trials, which represent the number of trials on which children endorsed the sentence provided by the passive voice informant (max = 4). At pretest, 44% (SD = 27%) of children preferred the passive voice sentence. Importantly, there were no differences in pretest performance between children assigned to the passive voice condition (M = 1.50, SD = 1.12) and those assigned to the active voice condition (M = 1.77, SD = 1.11), $t(40) = -0.07$, p = .95.

Next, we examined possible shifts from pretest to posttest in the number of initial preference trials on which children endorsed the sentence provided by the passive voice informant. We regressed the number of initial preference trials at posttest on a dummy-coded condition variable (0 = active, 1 = passive) while controlling for scores on pretest initial preference trials. Pretest scores significantly and positively predicted posttest scores, B = 0.37, SE = 0.16, p = .02, 95% confidence interval (CI) = [0.06, 0.69]. Importantly, there was also a significant condition effect over and above pretest scores, B = 0.82, SE = 0.34, p = .02, 95% CI = [0.14, 1.51] (Fig. 2A), indicating that the shift in mean preference scores (i.e., number of trials endorsed at posttest subtracted by number of trials endorsed at pretest) for children in the passive voice condition (M = .70) was significantly greater than that for children in the active voice condition (M = −.13).

We next examined whether the active or passive voice condition affected children's willingness to learn from an informant who uses passive voice testimony, as measured by children's selective preference for learning novel morphology and labels. Scores on each task indicate the number of trials (max = 4) on which children endorsed the label or morphology from the informant who previously used passive voice. At pretest, there were no condition differences on novel morphology trials, p = .16. There was a marginally significant condition difference at pretest on novel label trials, favoring the passive condition (M = 2.10, SD = 1.07) over the active condition (M = 1.45, SD = 1.10), $t(40) = 1.92$, p = .06. Nonetheless, a chi-square analysis indicated that label and morphology scores were similar to one another at pre- and posttest, McNemar $\chi^2(1, N = 42) < 1.00$. Thus, we combined trials, yielding one implicit judgment score at pretest and one at posttest (max = 8).[2]

We then used linear regression to predict the number of trials on which children chose to learn from the passive informant by condition (active = 0, passive = 1), again controlling for pretest scores. The number of trials children chose to learn from the passive informant at pretest predicted posttest scores, B = 0.78, SE = 0.11, p < .001, 95% CI = [0.56, 1.00]. Critically, there was also a condition effect, indicating that children in the passive condition (M = 5.75, SE = 0.49) chose to learn from the passive informant on significantly more trials than children in the active condition (M = 2.95, SE = 0.38), B = 1.89, SE = 0.44, p < .001, 95% CI = [1.00, 2.77] (Fig. 2B). Thus, the results from both initial preference

[2] We combine label and morphology trial types for parsimony, but note that significant condition effects were also observed when analyses were run separately by trial type.

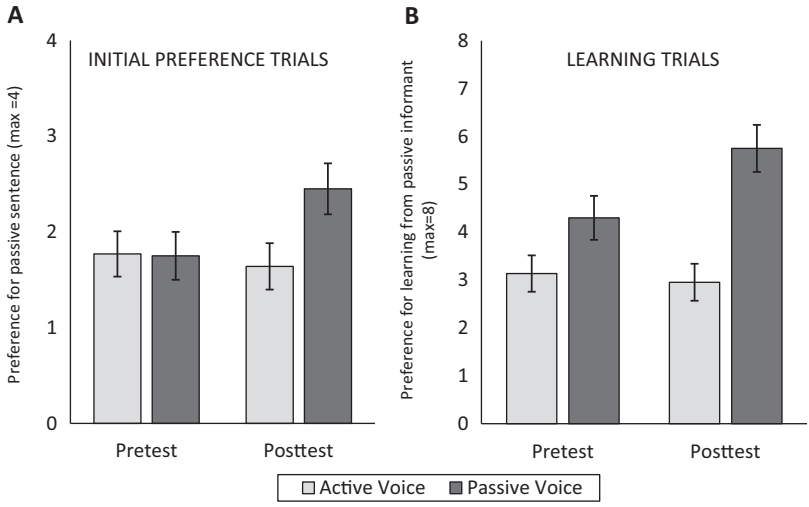

Fig. 2. (A) Number of trials on which children chose the passive informant on initial preference trials. (B) Number of trials on which children chose to learn novel labels and morphology from the passive informant.

and learning trials are consistent with our third hypothesis; exposing children to the passive voice shifts their learning preferences to informants whose testimony includes cues to syntactic complexity, whereas children in the active voice condition showed no such shift.

Finally, we explored whether children's explicit judgments also shift following the book-reading sessions. Children received a point if they indicated that the passive voice informant was "better" than the active voice informant at talking about the pictures. Across the entire sample, 48% of children judged the passive informant to be better at talking about the pictures during the pretest, and this increased to 62% at posttest. However, there was only a marginally significant difference in explicit judgments between conditions at posttest; children in the passive condition (75%) were marginally more likely to judge the passive voice informant as better than children in the active condition (50%), $\chi^2 = 2.78$, $p = .09$.

Discussion

A tacit but largely untested assumption is that children's credibility judgments are stable, developing during the preschool years and remaining robust to variations in environmental inputs. Here, we showed evidence that subtle changes to the syntactic complexity of adult testimony resulted in localized shifts to children's credibility judgments. Specifically, syntactically complex passive voice testimony during 10 book-reading sessions led children to shift their trust, both preferring passive voice testimony and using this testimony to make inferences about who to learn novel information from during the posttest. By contrast, selective trust among children who heard storybooks written in the syntactically simpler active voice did not shift significantly.

Our results help to disentangle three hypotheses regarding how manipulating cues to credibility in adult testimony may affect children's credibility judgments. Data were consistent with our third hypothesis in that exposure to the passive voice was associated with shifts in children's implicit credibility, but exposure to the active voice had no demonstrable impact. Interestingly, we did not see an effect of the manipulation on children's explicit credibility judgments. Although it is possible that this analysis was underpowered, this asymmetry has been observed in other experimental data with 4-year-olds (e.g., Corriveau et al., 2016; Sobel & Corriveau, 2010), raising an important question for future work of why children demonstrate implicit preferences but do not express them explicitly.

Our test case of the passive versus active voice was chosen so that we could manipulate syntactic complexity while holding content of the testimony constant. Corpus studies of child-directed speech, however, have revealed that children are rarely exposed to the passive voice, with this construction making up less than 1% of caregiver speech input (Gordon & Chafetz, 1990), and is similarly rare in children's books (Caputo & Arunachalam, 2017). Given this, it is possible that the shift in selective trust was not related specifically to features of the passive voice. Rather, we propose that passive voice is a general marker of complexity in speaker testimony, which previous work has found to be an important cue for the formation of credibility judgments (Corriveau et al., 2016). Given the rarity of the passive in child-directed speech, another open question for future work is whether other syntactically complex linguistic features more common in child-directed speech—for example, complex questions and embedded clauses—also shift selective trust.

This question is particularly important because, on average, children from lower-SES backgrounds—such as the children who participated in the current study—hear less complex language from caregivers compared with their higher-SES peers (Hoff, 2003; Huttenlocher et al., 2002, 2007). SES-related differences in input are associated with differences in children's language and literacy outcomes (Hart & Risley, 1995; Hoff, 2003, 2006; Huttenlocher, Haight, Bryk, Seltzer, & Lyons, 1991; Rowe, 2012), and it is possible that these SES effects are also associated with longer-term credibility judgments once children enter formal schooling. One such example is the syntactically complex testimony that children encounter when entering kindergarten and higher levels of formal schooling. Specifically, testimony surrounding the instruction of new concepts, absent or invisible referents, and scientific phenomena is syntactically more complex than colloquial language used outside of educational contexts (Cummins, 1983; Snow, 2010; van Kleeck, 2014). Thus, a reliance on cues to syntactic complexity may be one factor that children weigh when deciding to accept academic information from adults, including teachers.

To our knowledge, this is the first study to manipulate cues to credibility in order to shift learning preferences. It adds to a growing body of experimental work that illustrates how brief changes to adults' speech correspond to changes in children's language and cognitive skills (Chernyak, Leech, & Rowe, 2017; Rhodes, Leslie, & Tworek, 2012; Vasilyeva et al., 2006). Although our data cannot explicitly speak to this claim, it may be that interventions aimed at shifting children's learning preferences can supplement interventions that target content knowledge (e.g., increasing oral language skills such as vocabulary or complex syntax) because learning preferences are one mechanism by which children acquire such content knowledge (Harris et al., 2018). Moreover, it is striking that a relatively short experimental manipulation had such a strong effect on learning preferences. This raises the question of how more experience with markers of syntactic complexity may confer larger effects on learning preferences than what was observed in the current study. For instance, Hoff-Ginsberg (1991) found that among lower-SES families, book reading was the context in which parents provided the most academically oriented language input to children. Thus, an important next step will be to examine whether increasing the frequency of book reading (even of commercially available books, not the bespoke books used in the current study) shifts lower-SES children's learning preferences and whether this shift can be attributed to an increase in the complexity of parental speech input.

Although the data here were collected in an experimental context, we argue that the mechanism at play is children's language experience and that this mechanism also unfolds under more naturalistic circumstances given variations in the syntactic complexity of caregiver input noted above. Therefore, in our future work, we are interested in two questions. First, what types of environmental inputs explain variation in the formation of credibility judgments during the early childhood period? Second, to what extent do differences in preschool children's credibility judgments gradually accumulate over time to result in larger differences in selective trust? The current work points us closer to addressing these questions by identifying a condition under which children's early learning judgments shift as a function of variations in adult testimony.

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Appendix A. Supplementary material

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jecp.2019.01.013.

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