Don’t Want to Look Dumb? The Role of Theories of Intelligence and Humanlike Features in Online Help Seeking

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Abstract
Numerous studies have shown that individuals’ help-seeking behavior increases when a computerized helper is endowed with humanlike features in nonachievement contexts. In contrast, the current research suggests that anthropomorphic helpers are not universally conducive to help-seeking behavior in contexts of achievement, particularly among individuals who construe help seeking as a display of incompetence (i.e., entity theorists). Study 1 demonstrated that when entity theorists received help from an anthropomorphized (vs. a nonanthropomorphized) helper, they were more concerned about negative judgments from other people, whereas incremental theorists were not affected by anthropomorphic features. Study 2 showed that when help was provided by an anthropomorphized (vs. a nonanthropomorphized) helper, entity theorists were less likely to seek help, even at the cost of lower performance. In contrast, incremental theorists’ help-seeking behavior and task performance were not affected by anthropomorphism. This research deepens the current understanding of the role of anthropomorphic computerized helpers in online learning contexts.

Keywords
theories of intelligence, help seeking, anthropomorphism, task performance, online learning, open data, open materials

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Computer applications have long included virtual assistants, such as virtual customer service agents for electronic commerce (McBreen & Jack, 2001) and virtual helpers in video games (Pinelle, Wong, & Stach, 2008). Recently, such digital assistants have become increasingly humanlike. For example, Apple’s Siri and Microsoft’s Cortana are equipped with a female voice (LaFrance, 2016), the MIT FitTrack system offers a humanlike avatar that helps people exercise (Bickmore, Caruso, Clough-Gorr, & Heeren, 2005), and Facebook Messenger’s M cracks jokes (Van Grove, 2016).

Attributing human characteristics to nonhuman entities is called anthropomorphism (Epley, Waytz, & Cacioppo, 2007). Anthropomorphism using visual portrayals (e.g., a humanlike voice or face) or linguistic portrayals (e.g., humanlike language) can evoke a human schema, which leads individuals to treat anthropomorphized nonhuman entities similarly to the way they treat humans (Waytz, Epley, & Cacioppo, 2010). Even minimal social cues can lead people to construe computerized systems as social actors and to respond socially to them (Nass, Steuer, & Tauber, 1994; Reeves & Nass, 1996).

Prior work in human-computer interaction has suggested ways to leverage this tendency. When a computerized helper was endowed with anthropomorphic features, participants created stronger and quicker bonds with the helper. People are more accepting of anthropomorphic than nonanthropomorphic assistants (Heerink, Kröse, Evers, & Wielinga, 2008) and enjoy interacting with them more (Katz & Halpern, 2014). Such assistants have also motivated the elderly to exercise more (Bickmore et al.,

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helped patients with schizophrenia adhere to their medication plan (Bickmore, Puskar, Schlenk, Pfeifer, & Sereika, 2010), and helped children with autism engage socially (Robins, Dautenhahn, Te Boekhorst, & Billard, 2005).

However, these previous studies have focused on the role of anthropomorphic features of digital assistants in nonachievement settings. Therefore, how such features affect individuals’ help-seeking behavior and task performance in achievement settings such as online learning is less well understood. In the present study, we demonstrated that anthropomorphic features may not prove beneficial in online learning settings, especially among individuals who believe their abilities are fixed (i.e., entity theorists) and, thus, worry about presenting themselves as incompetent to others.

**Online Learning and Help Seeking**

Online learning is an increasingly popular tool across most levels of education. Currently, all 50 states in the United States offer online learning at the K–12 level (Watson, Pape, Murin, Gemin, & Vashaw, 2014), and about 74% of K–8 teachers use educational software (e.g., educational digital games) as classroom tools (Takeuchi & Vaala, 2014). The burgeoning popularity of online learning is largely due to its efficiency of scale. Students can access educational instruction and content at any time from any location with relatively low cost, little effort, and only a small time investment (Harasim, 2000). In addition, compared with traditional face-to-face instruction, online learning provides more privacy by concealing the learner’s personal identity, including gender, race, and appearance (Karabenick & Knapp, 1988). This characteristic of online learning is considered to be advantageous because securing learners’ privacy leads to more adaptive learning strategies, such as help seeking (Karabenick & Knapp, 1988).

Help seeking is an effective learning strategy to acquire knowledge and develop competence (Nelson-Le Gall, 1985; Newman, 1994). Nonetheless, individuals often forgo opportunities to seek help from others because asking for help can feel psychologically costly if they worry that others will perceive them as dumb if they ask for assistance (Ashford, 1986; Bohns & Flynn, 2010). Would students be more likely to seek help if they did not have to worry about looking dumb? Many teachers and practitioners have suggested that online learning increases learners’ help seeking by securing learners’ privacy and thereby reducing the psychological costs of help seeking (Aleven, Stahl, Schworm, Fischer, & Wallace, 2003; Karabenick & Knapp, 1988).

Thus, in the hope of increasing help seeking and facilitating learning, most computer-based learning environments offer various forms of help (Aleven et al., 2003), such as tutoring systems that provide context-specific help (Wood & Wood, 1999) and online dictionaries and textbooks (Aleven & Koedinger, 2000).

However, despite the ready availability of such software-embedded forms of help, learners often do not use them effectively, or they may even ignore them completely (Aleven & Koedinger, 2000; Aleven et al., 2003; Wood & Wood, 1999). Therefore, simply moving learning from a social environment to a computer-based context seems insufficient to enhance individuals’ help-seeking behaviors, which limits the potential of computer-based learning environments (Aleven & Koedinger, 2000). Unless it is understood who is more (or less) likely to seek help and when they will do so during online learning, the use of computerized help will not be maximally effective.

To this end, the current research explored the role of an anthropomorphized helper during online learning. One might expect that anthropomorphic computerized helpers in achievement settings would enhance help seeking, as they do in nonachievement settings. However, there is reason to believe otherwise. In achievement settings, individuals may believe that receiving help from others will result in negative judgments. Likewise, prior work has shown that both learners and teachers view independent persistence as a desirable strategy for coping with difficulty, while receiving help is considered evidence of a lack of ability (Nelson-Le Gall, 1985; van der Meij, 1998). Thus, in achievement settings, help seeking might imply dependence and inferiority, so individuals might be concerned about the psychological costs of help seeking (Ryan & Pintrich, 1997).

We argue that anthropomorphic cues in a computerized helper can heighten the psychological costs of help seeking (e.g., concern about others’ perceptions) in achievement settings and concomitantly reduce help-seeking behavior. This prediction follows from prior work on anthropomorphism, which suggests that thinking about nonhuman entities with humanlike features induces the same processes that are involved when individuals think about other people (Epley et al., 2007; Nass et al., 1994; Shariff & Norenzayan, 2007). Accordingly, we argue that individuals may be more concerned about the psychological costs of receiving help when the help comes from a computerized helper with anthropomorphic features than when it comes from a computerized helper without such features.

We further propose that the effect of an anthropomorphized helper on help seeking varies depending on how individuals construe help seeking. Some may perceive help seeking as a sign of incompetence, while others may see it as a natural part of the process of learning. These individual differences in perceptions of help seeking can be explained by theories of intelligence (TOIs).
TOIs and Help Seeking

Individuals perceive help seeking differently depending on their beliefs, or theories, about intelligence (Dweck, 2000; Yeager & Dweck, 2012). People with an entity theory believe their abilities are stable and cannot be changed. As a result, when facing difficulties, entity theorists are concerned about how others will evaluate them (Hong, Chiu, Dweck, Lin, & Wan, 1999). Even in a situation where help is available, they are hesitant to ask for help for fear of being regarded as incompetent. People with an incremental theory, however, believe they can improve their abilities with effort and effective learning strategies (Blackwell, Trzesniewski, & Dweck, 2007; Dweck, 2002; Dweck & Leggett, 1988). As a result, when work becomes difficult, incremental theorists increase their efforts and look for ways to improve their skills by seeking help when needed. They construe receiving help as part of an informative learning experience rather than an indicator of a lack of ability (Dweck, 2000; Yeager & Dweck, 2012).

On the basis of these findings, we proposed that entity theorists would be more sensitive to anthropomorphic cues in a computerized helper than incremental theorists would be. Specifically, entity theorists might be less likely to seek help when they encounter an anthropomorphic (vs. a nonanthropomorphic) helper because its anthropomorphic features might heighten self-presentation concerns associated with receiving help. Conversely, because incremental theorists are less concerned about others’ judgments, their decisions to seek help should be less affected by the presence of anthropomorphic cues. Across two studies, we explored the role of anthropomorphic cues and TOIs in the perceived cost of help seeking (Study 1), as well as in help-seeking behaviors and task performance (Study 2).

Study 1

Study 1 tested whether individuals’ perceived costs of receiving help differed depending on the presence or absence of anthropomorphic features in a computerized helper and their implicit beliefs about intelligence. Specifically, we tested whether entity and incremental theorists perceived greater costs of receiving help when the help was provided by an anthropomorphized (vs. a nonanthropomorphized) helper.

Method

Participants. Given the effect sizes of prior work on theories of intelligence (average $d = 0.65$; Dyczewski & Markman, 2012; Miele & Molden, 2010; Rattan, Good, & Dweck, 2012) and help seeking (average $d = 0.60$; Bohs & Flynn, 2010; Flynn & Lake, 2008; Nadler & Chemyak-Hai, 2014; Nadler, Harpaz-Gorodeisky, & Ben-David, 2009), an a priori power analysis indicated that about 40 participants per condition would provide sufficient power (greater than 80%) to detect group differences tested at a false positive rate of 5%. Thus, we aimed to recruit at least 40 participants per condition to ensure sufficient power. We recruited participants from an online subject pool using Amazon’s Mechanical Turk. Sixteen participants did not complete the study (7.27% attrition rate). Among them, 6 (2.73% attrition rate) dropped out before the anthropomorphism manipulation. Among the 10 dropouts who were assigned to a condition, 6 participants (2.73% attrition rate) were in the anthropomorphism condition, and 4 (1.82% attrition rate) were in the nonanthropomorphism condition. Two hundred four participants, all from the United States and with at least 95% approval ratings on Mechanical Turk, were successfully recruited. Among them, 17 participants (8.53%) who did not correctly answer instructional manipulation check questions (Oppenheimer, Meyvis, & Davidenko, 2009) were excluded from the data analyses. The 187 remaining participants provided complete data (95 women; mean age = 39.14 years).

Procedure and measures. Participants completed an eight-item questionnaire measuring their beliefs about the malleability of intelligence (e.g., "You have a certain amount of intelligence, and you can't really do much to change it" and "You can always substantially change how intelligent you are"); Dweck, 2000), answers were made on a 6-point Likert scale (1 = strongly disagree, 6 = strongly agree; $\alpha = .97$), and items were embedded in the filler questionnaire (e.g., food items consumed the previous day). Four incremental items were reverse-coded, so higher scores represent greater endorsement of entity theory.

Next, participants completed the Remote Associates Test (RAT; adapted from Mednick, 1962). We framed the RAT as an intelligence task (i.e., “The purpose of this task is to gain some understanding about your intelligence”; further discussion about the task framing is provided in the Supplemental Material available online). This was done to impose an evaluation component to make participants feel that the task was testing their intelligence (i.e., an achievement setting was created). In the RAT, they were asked to find a commonality among three presented words. For example, when given “Room, Blood, Salts,” participants had to type “Bath.” Participants were told that for some questions, they would automatically receive an additional word (e.g., “Tub”) as a hint to help them guess the answer. On a computer screen, 16 RAT problems were presented one at a time, and all participants received the same amount of help for 8 relatively more difficult problems. The same amount of help was given to all
participants to test whether the perceived costs of receiving the same help differed depending on the presence of anthropomorphic features in a computerized helper and individuals’ TOIs. The average number of correct answers (11.26 out of 16) indicates that, in general, the participants were engaged in the task even though there were no incentives for performance.

Whenever participants received help, either an anthropomorphized or a nonanthropomorphized computerized helper provided a fourth word (see Fig. A1 in the appendix). Participants in the anthropomorphism condition received help from a computer-shaped icon with a humanlike face (Epley et al., 2007), with the hint placed inside a speech bubble so that it appeared more like a person’s dialogue. In contrast, participants in the nonanthropomorphism condition saw a computer-shaped icon without a humanlike face, and the hint text did not appear in a speech bubble.3

Participants’ perception of the cost associated with receiving help was measured using six items (e.g., “It was embarrassing to receive help during the task” and “Others might think I am incompetent because I received help during the task”; adapted from Ashford, 1986; VandeWalle, Ganesan, Challagulla, & Brown, 2000). Ratings were made on a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree; α = .96).

**Results**

**Perceived costs of receiving help.** We regressed participants’ perception of the cost of receiving help on anthropomorphism, TOI, and their interaction. All variables were z standardized prior to creating the interaction term to facilitate interpretation of the results. The analysis revealed a significant main effect of TOI, \( \beta = 0.20, p = .005, 95\% \) confidence interval (CI) = [0.06, 0.34], and a nonsignificant main effect of anthropomorphism, \( \beta = 0.09, p = .200, 95\% \) CI = [–0.05, 0.23], which were qualified by a significant interaction effect, \( \beta = 0.15, p = .032, 95\% \) CI = [0.01, 0.30] (Fig. 1).4 Further analyses indicated that entity theorists (+1 SD from the mean) perceived greater psychological costs of receiving help when the computerized helper was anthropomorphized than when it was not, \( t(183) = 2.44, p = .016 \), whereas incremental theorists’ (-1 SD from the mean) perceived costs of receiving help did not differ according to whether or not the computerized helper was anthropomorphized, \( t(183) = -0.62, p > .250 \). Thus, even in the absence of a real-person helper, anthropomorphic cues were sufficient to heighten self-presentational concerns among entity theorists but not among incremental theorists.

**Performance.** Given that all participants received the same amount of help (eight questions), we did not predict differences in performance. Consistent with our prediction, results showed that anthropomorphism, TOI, and their interaction did not significantly predict performance, \( ps > .250 \).

**Discussion**

These findings indicate that entity theorists perceived greater costs of receiving help from an anthropomorphized rather than a nonanthropomorphized helper, whereas incremental theorists’ cost perception was not affected by anthropomorphism. In this study, we provided participants with the same amount of help in all conditions to test whether the perceived costs of receiving the same help differed depending on the presence of anthropomorphic features in a computerized helper and individuals’ TOIs. This design allowed us to control the content and the amount of help participants received, so we were able to examine differences in participants’ perceived costs of receiving help. In Study 2, we allowed participants to choose whether or not to seek help for each question to examine whether anthropomorphic features in a computerized helper and individuals’ TOIs influenced help-seeking behavior and task performance.

**Study 2**

Study 2 tested whether entity theorists were less likely to seek help and, consequently, perform worse in the task when the help was provided by an anthropomorphized (vs. a nonanthropomorphized) helper. We predicted that incremental theorists’ help seeking and task performance would be less affected by anthropomorphic cues.
Method

Participants. We aimed to recruit about 40 participants per condition (total 160 participants) based on the a priori power analysis in Study 1. During the experiment session, we recruited 171 undergraduate students at a large university in Hong Kong (116 women; mean age = 20.74 years). No participants were excluded from the data analyses.

Procedure and measures. In this study, to draw a causal inference, we manipulated individuals’ TOIs with artificial science articles (adapted from Plaks & Stecher, 2007). Half the participants read an article supporting entity theory (e.g., “neither environmental factors nor intense willpower appear to change this basic stability of intelligence”), while the other half read an article supporting incremental theory (e.g., “intelligence seems to be rather malleable and to develop significantly over time”). After reading the article, participants completed a manipulation check (“To what extent do you believe that a person’s intellectual abilities are fixed and cannot be changed?” 1 = not at all, 7 = very much).

Participants first answered 10 RAT practice questions, for which help was not provided, and then solved 16 main problems. Before starting the main problems, all participants were told that they could choose whether to receive help or not for each question and were presented with either an anthropomorphized or a nonanthropomorphized helper, depending on the condition. Specifically, for each question, participants could answer without help or could click the “I want to get help” button to receive a hint. When they clicked the button for help, either the anthropomorphized helper or the nonanthropomorphized helper provided a hint for the given question (see Fig. A2 in the appendix). The hint was the first letter of the answer (e.g., “b___ aid/rubber b___/b___wagon” for the question “aid, rubber, wagon,” where the answer was “band”). We recorded the total number of questions in which participants sought help and their performance on the RAT. The average number of correct answers (10.11 out of 16) indicates that, as in Study 1, the participants were generally engaged in the task even though there were no incentives for performance.

We also measured the perceived usefulness of the help using three items (e.g., “I believe the provided help is useful for better performance”; 1 = not at all, 7 = very much; α = .90). Perceived usefulness was measured to rule out an alternative explanation that anthropomorphic features and TOIs might change the extent to which participants perceived the hints as useful. The results showed that the perceived usefulness of the help did not differ depending on the presence of anthropomorphic features or TOI manipulation (all ps > .20).

Results

TOI manipulation check. Participants in the entity-theory condition expressed a stronger belief in fixed intelligence (M = 4.59, SD = 1.54, 95% CI = [4.25, 4.93]) than did those in the incremental-theory condition (M = 2.67, SD = 1.57, 95% CI = [2.38, 2.96]), t(169) = 8.63, p < .001, d = 1.32, 95% CI for d = [0.99, 1.65].

Amount of help seeking. On average, participants sought help for 9.55 problems (SD = 4.20, 95% CI = [8.92, 10.18]). A 2 (TOI: entity vs. incremental) × 2 (anthropomorphism: yes vs. no) between-subjects analysis of variance (ANOVA) revealed nonsignificant main effects, ps > .20, but a significant interaction, R(1, 167) = 6.30, p = .013, η2 = .04 (Fig. 2). Results were identical when we included gender and age as covariates. In addition, although statistically not significant, there was a trend in which individuals who performed poorly on the practice questions tended to seek more help in the main test, r(169) = −.12, p = .111. However, the results were identical regardless of whether or not performance on the practice questions was controlled.

As predicted, participants in the entity-theory condition were less likely to seek help when the computerized helper was anthropomorphized (M = 8.70, SD = 5.11, 95% CI = [7.41, 9.99]) than when it was not (M = 11.09, SD = 3.83, 95% CI = [9.85, 12.33]), R(167) = 2.64, p = .009, d = 0.53, 95% CI = [0.09, 0.98]. Participants in the incremental-theory condition did not differ significantly in their help-seeking behavior regardless of

![Fig. 2. Mean number of problems on which participants sought help in Study 2 as a function of participants’ theory of intelligence (TOI) and whether or not the help was given by an anthropomorphic icon. Error bars represent ±1 SE. Asterisks indicate a significant difference between conditions (p < .01).](image-url)
whether the helper was anthropomorphized ($M = 9.53$, $SD = 3.37$, 95% CI = [8.37, 10.69]) or not ($M = 8.74$, $SD = 4.19$, 95% CI = [7.45, 10.05]), $t(167) = 0.89$, $p > .250$, $d = 0.21$, 95% CI = [-0.22, 0.64].

Given the nature of counting data (i.e., number of help-seeking behaviors), we also conducted a negative binomial regression. The analysis revealed a significant interaction, $b = -0.33$, $SE = 0.15$, $z = -2.25$, $p = .024$. Specifically, entity theorists were less likely to seek help when the hints were provided by the anthropomorphized helper than the anthropomorphized helper, $b = -0.24$, $SE = 0.12$, $z = -2.06$, $p = .039$. In contrast, incremental theorists’ help-seeking behavior did not vary depending on the presence of the anthropomorphized cues, $b = 0.09$, $SE = 0.09$, $z = 0.95$, $p > .250$. Therefore, our results are robust to model selection.

**Performance.** A 2 (TOI: entity vs. incremental) × 2 (anthropomorphism: yes vs. no) between-subjects ANOVA on performance scores revealed nonsignificant main effects of TOIs, $F(1, 167) = 0.80$, $p > .250$, $\eta_p^2 = .005$, and anthropomorphism, $F(1, 167) = 2.77$, $p = .098$, $\eta_p^2 = .02$, which were qualified by a significant interaction, $F(1, 167) = 6.46$, $p = .012$, $\eta_p^2 = .04$ (Fig. 3). Again, results were identical regardless of whether or not performance on the practice questions was controlled.

In the entity-theory condition, participants answered fewer questions correctly when the computerized helper was anthropomorphized ($M = 8.75$, $SD = 4.43$, 95% CI = [7.70, 9.80]) than when it was not ($M = 10.93$, $SD = 2.88$, 95% CI = [9.91, 11.95]), $t(167) = 2.94$, $p = .004$, $d = 0.59$, 95% CI = [0.14, 1.04]. In the incremental-theory condition, on the other hand, no significant performance difference was observed (anthropomorphized: $M = 10.53$, $SD = 2.40$, 95% CI = [9.58, 11.48]; nonanthropomorphized: $M = 10.08$, $SD = 3.67$, 95% CI = [9.01, 11.15]), $t(167) = 0.63$, $p > .250$, $d = 0.15$, 95% CI = [-0.28, 0.58].

**Mediation analyses.** To test whether the amount of help seeking mediated the interactive effect of anthropomorphism and TOI on performance, we conducted a bootstrapped analysis using the PROCESS macro (Hayes, 2013; Fig. 4). Overall, the interaction effect between anthropomorphism and TOI on task performance was mediated by the amount of help seeking, 95% CI = [-2.59, -0.23]. More specifically, the amount of help seeking mediated the effect of anthropomorphism on performance in the entity-theory condition, 95% CI = [-1.98, -0.17], but the mediation was not significant in the incremental-theory condition, 95% CI = [-0.28, 1.02]. Therefore, as predicted, the anthropomorphic features of the computerized helper changed help-seeking behavior and, in turn, influenced task performance, but only among entity theorists.

**Discussion**

Study 2 showed that when help was provided by an anthropomorphized (vs. a nonanthropomorphized) helper, entity theorists were less likely to seek help even at the cost of lower performance. In contrast, incremental theorists’ help-seeking behavior and task performance were not affected by anthropomorphism. Although our main research goal was to examine whether the effect of anthropomorphic features depends on TOIs, it is worth discussing the differences between entity and incremental theorists. For example, in the nonanthropomorphism condition, entity theorists (+1 SD from the mean) and incremental theorists (−1 SD from the mean) did not differ in their cost perception of help seeking in Study 1, $t(183) = 0.47$, $p > .250$, but entity theorists were more likely than incremental theorists to seek help in Study 2, $t(80) = -2.65$, $p = .011$. We speculate that this might be because in the absence of a social presence, there was no reason to be concerned about self-presentation, even for entity theorists, resulting in no significant difference in the perceived cost of help seeking between entity and incremental theorists. However, in such situations, since entity theorists gravitate more toward performing well than do incremental theorists (Dweck, 2000; Dweck & Elliott, 1985), they might be more likely to seek help to ensure high performance.
General Discussion

This research is the first to show that, in achievement settings, the use of anthropomorphic computerized helpers can backfire and hurt performance. In contrast to past research documenting the benefits of anthropomorphized helpers in nonachievement settings (Bickmore et al., 2010; Katz & Halpern, 2014), the present results show that in achievement settings, entity theorists avoid seeking help when they feel like someone (i.e., an anthropomorphized helper) rather than something (i.e., a nonanthropomorphized helper) is helping them. Why do the effects of anthropomorphized helpers differ in nonachievement and achievement contexts? One possibility is that in achievement settings, self-reliance is valued, while dependence on others is considered to imply inferiority (Ryan & PINTRICH, 1997). Individuals worry about negative judgments from others when seeking help, and such concerns about potential loss of face are heightened in the presence of other people. Thus, anthropomorphic cues in a computerized helper that enhance social presence (Epkey et al., 2007) can increase self-representational concerns, which prevent individuals who are sensitive to such concerns from seeking help.

Additionally, we showed that entity theorists' self-presentation concern applies even to imagined social evaluators. Prior research has shown that entity theorists seek to avoid unfavorable judgments from other people and construe help-seeking behavior as a public display of incompetence (DWECK, 2000; YEAGER & DWECK, 2012). Extending this line of research, the current study demonstrated that even in the absence of a real person, minimal social cues (anthropomorphic features) ignite entity theorists' concerns about the costs of help seeking, which in turn reduces their help-seeking efforts, resulting in poorer performance. In contrast, incremental theorists, who are less concerned about the costs of help seeking, did not differ in their help-seeking behavior and task performance regardless of whether or not the computerized helper was anthropomorphized. Note that the differential effects of anthropomorphic features on help-seeking behavior depending on TOIs were not driven by a perception of the utility of the provided help.

One may wonder about the relationship between help seeking in Figure 2 and performance in Figure 3. For example, although incremental theorists tended to seek as much help as entity theorists in the anthropomorphism condition, \( p > .250 \) (two black bars in Fig. 2), the former performed better than the latter, \( p = .014 \) (two black bars in Fig. 3). One possible explanation for this is that entity and incremental theorists may seek help for different reasons at different time points. In the presence of social cues, entity theorists tend to avoid help because of a self-representational concern, and they more easily give up on the task without making further efforts (Dweck, 2000; Hong et al., 1999). In contrast, incremental theorists tend to construe help as a self-regulated learning strategy (Yeager & Dweck, 2012). Thus, incremental theorists might have requested help only when they felt they were not able to solve the problem even after trying for a while. That is, incremental theorists might have tried harder than entity theorists at first to find the answers on their own, and sometimes this attempt might have helped them identify the correct answers, leading them to perform better even after seeking comparable amounts of help as entity theorists. To test our prediction, future research can measure whether the time spent before requesting help differs depending on TOI and the presence of anthropomorphic cues.

The current results also invite future research exploring how anthropomorphic cues can affect the likelihood
of seeking different types of help. Prior work has shown that not all types of help are beneficial (Nelson-Le Gall, 1985; Newman, 1994); some, such as asking for answers without trying to understand the process, are considered to be maladaptive because such help seeking does not result in actual learning. Adaptive help seeking involves acquiring successful processes for solving problems (Newman, 1994; Ryan & Pintrich, 1997) and includes asking for hints to solve a problem, examples of similar problems, and clarification of the problem. In the current study, we provided hints instead of answers because hints represent a more adaptive form of help (Nelson-Le Gall, 1985).

Another fruitful venue for future research is to investigate when anthropomorphic features are beneficial in online learning. First, anthropomorphic cues in online learning systems might increase social presence, thus making learning environments less impersonal. It is possible that anthropomorphic cues help individuals persist in a challenging task by providing social and emotional support (e.g., a human voice providing encouraging messages to learners). Furthermore, anthropomorphic features might reduce individuals’ maladaptive help seeking by heightening the associated self-presentational concerns (e.g., “The learner is seeking a shortcut without actually learning anything”). In this situation, an anthropomorphized helper might play the role of surveillance eyes.

Finally, the samples of Studies 1 and 2 were quite different (Westerners in Study 1 and Asians in Study 2). Although recent work has shown that TOI scores between Asians and Westerners are comparable (Park & Kim, 2015), future research can explore certain situations in which cultural differences may play a role.

To conclude, the current investigation has important theoretical and practical implications. Our findings broaden the theoretical understanding of the role of anthropomorphic cues in help systems by demonstrating the interactive effects of TOIs and anthropomorphic features on help seeking. The current research is the first to show that an entity theory is related not to a universal lack of help seeking but rather only to a resistance to seeking help when doing so comes at the cost of seeming incompetent to an evaluator, even an imagined evaluator. Practically, our findings suggest that very minimal social cues in help systems can direct some students away from learning. Thus, when developing educational computer programs for online learning, educators and program designers should pay special attention to unintended meanings that come from online learning features—which can vary across individuals as a function of their TOI—to more effectively encourage students to seek help and benefit from receiving it.

### Appendix

**Fig. A1.** Screenshots showing the anthropomorphized helper (top) and nonanthropomorphized helper (bottom) in Study 1.

**Fig. A2.** Screenshots showing the anthropomorphized helper (top) and nonanthropomorphized helper (bottom) in Study 2.

### Action Editor

Ayse Uskul served as action editor for this article.

### Author Contributions

S. Kim and D. Park developed the study concept. All authors contributed to the study design. Data were collected by K. Zhang. All authors analyzed the data. S. Kim and D. Park wrote the manuscript, and K. Zhang provided feedback.

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Open Practices

All data and materials have been made publicly available via the Open Science Framework and can be accessed at https://osf.io/xp6r7/. The complete Open Practices Disclosure for this article can be found at http://journals.sagepub.com/doi/suppl/10.1177/0956797617730595. This article has received the badges for Open Data and Open Materials. More information about the Open Practices badges can be found at http://www.psychologicalscience.org/publications/badges.

Notes

1. We used two instructional manipulation check questions: one at the beginning of the survey before participants were assigned to conditions and the other at the end of the survey. Three participants failed the first check question, and their survey was automatically terminated before condition assignment. Among 14 participants who failed the second check question, 8 were from the nonanthropomorphism condition, and 6 were from the anthropomorphism condition; the difference was not statistically significant, p > .250.

2. For information about problem difficulty, see Bowden and Jung-Beeman (2003) and www.remote-associates-test.com.

3. An independent pretest (N = 84) indicated that the anthropomorphized computer-shaped icon (M = 3.95, SD = 1.25, 95% CI = [3.56, 4.34]) was perceived to be more like a person (e.g., “the computer icon looks like a person”; α = .89) than the non- anthropomorphized icon (M = 2.33, SD = 0.96, 95% CI = [2.03, 2.63]), r(82) = 6.70, p < .001, d = 1.46, 95% CI for d = [0.97, 1.95]. The two icons did not induce different moods (all ps > .18).

4. The interaction term remained significant, β = 0.16, p = .027, 95% CI = [0.02, 0.30], even after controlling for gender, age, income, and education. Analyses including ethnicity are available in the Supplemental Material.

References


Heerink, M., Kröse, B., Evers, V., & Wielinga, B. J. (2008). The influence of social presence on acceptance of a


