

## Connecticut Debate Association

January 9, 2016

**E.O. Smith High School, King School and Trumbull High Schools**

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**Resolved: Children should not have “intelligent” or internet-enabled toys.**

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### Meet Supertoy Ted, the World's First talking teddy bear

The Daily Mail, by Mark Prigg, 30 July 2013

It works using a special app downloaded to a mobile phone, which is then plugged into the toy's robotic system and zipped into the back of the toy to control it.

Created by British developers Ashley Conlan and Karsten Flügge, the toy has robotic limbs and a mouth synced to its internal speaker.

‘When we were growing up’, said Conlan, ‘we loved robots that talked in movies and TV shows, and we felt good about seeing the magic they created.

‘Now we have managed to create a great prototype that we feel will revolutionise how children interact with their toys and how adults think of artificial intelligence.’

As well as reading stories, the bear can answer questions about the weather, and even read news stories as well as set alarms or play music or radio stations.

It can speak over 30 languages and learns a user's voice and likes over time, adapting to their personal favourites.

Supertoy Ted's creators were inspired by talking bears in films and on TV when they were younger, such as Super Ted although comparisons will be drawn with the bear in 2012 film Ted.

‘Being connected to the internet also means Supertoy upgrades over time and becomes better and better as it learns,’ the team say.

It has even attracted celebrity backing. Stephen Fry, a financial backer of the project said, ‘It's a pleasure and privilege to be involved - let's hope you hit the mark and that it all turns out well.’

Once the funding has been raised, the team hope to make the toy available around the world, and hope to have it on shelves in time for Christmas.

The bear is intended to launch in time for Christmas and will come with three modes, one for children, one for general use and one for adults, with the creators say will be similar to the talking toy in the film Ted (pictured) who uses colourful language to entertain Mark Wahlberg's character, John Bennett

They previously created Jeannie, a chatbot available for download on Android which has been downloaded more than 3 million times.

The Kickstarter campaign finishes on August 22nd and the creators are giving away limited edition versions of the teddy as well as all-inclusive tours of their factory in Asia.

Super-backers pledging £5,000 or more will have their own voice recorded and programmed as an available option when user's turn the teddy on for the first time.

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### Talking Toys Are Getting Smarter: Should We Be Worried?

THE WALL STREET JOURNAL, By GEOFFREY A. FOWLER, Dec. 17, 2015 1:50 p.m. ET

Internet-connected talking dolls like Hello Barbie that can actually converse are bewitching kids but unsettling parents. Are they really the menace critics have made them out to be?

A FEW WEEKS AGO, I had a play date with an almost-6-year-old who loves, loves, loves Barbie. Riley, as we'll call her, has four of the dolls and plays with them incessantly. So when Riley's mother, an old friend, said it would be OK for me to bring over the most technologically advanced Barbie ever created—one that can not only speak but understand what a child is saying and respond appropriately—I suspected Riley would be ecstatic.

Riley's mother? Not so much. “What does it do to imagination?” she asked. Riley has no problem making up her own adventures. Wouldn't this toy ultimately stifle Riley's creativity and supplant free play?

My friend's concerns are widely shared. Hello Barbie, as the toy is called, has been assailed in the media as “stupid” and a “blabbermouth.” The nonprofit advocacy group Campaign for a Commercial-Free Childhood deemed the doll to

be the “perfect storm of a terrible toy, threatening children’s privacy, well-being, and creativity.”

Whether you’re a parent yourself or are simply interested in what the future of humanity is doing for fun these days, this next generation of Internet-connected talking toys—of which Hello Barbie is only one—may give you pause. Given all the hand-wringing, I decided to spend some quality face time with these conversationally minded dolls, spend more time observing how children like Riley interact with them and talk to the toys’ creators to get a handle on the underlying technology.

Magical as these toys might appear, they’re a lot like Apple’s Siri trapped inside the body of a doll. Whenever you press Hello Barbie’s silver-studded belt-buckle, the doll records your child’s voice then instantly sends the audio over your Wi-Fi to the cloud to analyze and trigger a prerecorded response. Another talking doll named My Friend Cayla, which made its debut overseas last holiday season, is a more primitive version that relies on your smartphone. Meanwhile, Dino, a talking dinosaur coming out next year from a company called Cognitoys, draws on IBM’s Watson supercomputer for some of its intelligence.

As with Siri in her early days, when she was still a bit of a dolt, the toys’ voice-recognition systems have a way to go. Hello Barbie sometimes misunderstood or ignored what Riley had said. (“I’m talking to you!” Riley would shout in frustration.) Computers still have an extremely tough time deciphering children’s voices and unique speech patterns; since not enough children have used speech-based technologies, these systems don’t yet have enough data to improve their performance. ToyTalk, the tech company that partnered with Mattel to bring Hello Barbie to life, stores by default everything the doll records for at least two years to help it better analyze children’s speech. As disturbing as that might sound, it’s worth noting that Apple stores recordings of everything you’ve ever uttered to Siri, too. (For more information about privacy and talking toys, see sidebar below.)

### **THE IMAGINATION QUESTION**

Maybe the best way to understand whether these toys hinder imagination is to look at their underlying technology. From an interactive standpoint, Hello Barbie is basically a voice-activated Choose-Your-Own-Adventure book, in that she gives children a limited number of choices as they go down the conversational path and has a finite, albeit vast, number of dialogue lines (8,000 in total, recorded by an actress).

Once you start talking to Hello Barbie, what you soon realize is that, although she can remember details—a child’s favorite color or whether she has a sibling—the doll is not a very good listener. Many of her questions are just setups to tell a scripted story. “If you could go on vacation anywhere in the world, where would you want to go?” she asked Riley before describing her own recent vacation. Sure, every now and then she invites Riley to chime in. (“It’s a warm day and my friends invited me to go to the beach. I’m not really sure what to wear. Um, maybe some mittens and a scarf?”) But ultimately, whatever the child says, Hello Barbie sticks to her script.

Despite Hello Barbie’s inability to participate in a child’s flights of fancy, the doll is programmed to extol the virtues of imagination. “I think it’s great to exercise your imagination and creativity!” she said to Riley. Also: “We love using our imaginations. We are so avant-garde!”

Far less scripted is Dino, a bright green plastic dinosaur. When I turned on a prototype of Dino, it asked me to give it a name. “Leroy Jenkins,” a colleague suggested. “Did you say my new name is Leroy Jenkins?” it responded attentively in a gruff computer-generated voice.

Like Hello Barbie, Dino has a repertoire of jokes, games and stories to tell. But it’s also capable having a more open-ended interaction than Hello Barbie because it connects over Wi-Fi to a server that then taps IBM’s Watson, a cognitive system that sifts through vast amounts of information and presents the most relevant bits. (Watson famously beat two human champions on Jeopardy.) Children can ask Dino anything, and Watson will try to find the answer in a trove of kid-friendly data. Ask Dino, “How far away is the moon?” for example, and the toy will vary the complexity of its answer based on the child’s age (which parents specify in an app). To a 5-year-old posing that question, Dino will say, “It is really far. Too far to walk!” To a 9-year-old, the reply is, “The moon is 238,900 miles away, and it moves farther away each year.” If Hello Barbie is akin to a Choose-Your-Own-Adventure, Dino will restrict your child’s imagination no more than an Encyclopaedia Britannica Junior.

### **IS THIS SKYNET?**

There is one major difference between these toys and Siri (or other voice-activated assistants): Siri isn’t pretending to be your friend. She’ll never tell you she loves your fashion sense or try to direct children’s play. What’s more, once we give a body to a speech-based computer program, our relationship to it somehow changes. It seems more real.

While much of Riley and Hello Barbie’s conversation revolved around topics like fashion and what Riley wanted to be when she grew up, at one point, the exchange turned more serious. The two had been chatting about swimming with dolphins when Barbie asked whether Riley had any pets. “I had a fish, but he died,” said Riley.

“Oh, no. I’m so sorry,” said the doll. “I know what it’s like to have a pet pass away. But we’ll always keep the great

memories we have of them, right?"

Riley seemed content with the exchange and quickly moved on to another topic that Barbie brought up. But MIT Professor Sherry Turkle, who for decades has been studying how children (and adults) interact with robots, had a different reaction. "Why are we letting this doll pretend it knows about dying? It doesn't," she said. Dr. Turkle doesn't see Hello Barbie as a harmless plaything. "It's a gateway toy to a socialization of children into seeing objects as adequate conversational partners." ToyTalk says it doesn't see its toys as a replacement for human interaction but rather as a means to foster it, since children often use the toys with peers or parents.

Professor Cynthia Breazeal, director of the MIT Media Lab's personal robots group, isn't as pessimistic. She leads research into how robots can help with delicate matters, like comforting the elderly or preparing children for kindergarten.

Ms. Breazeal, it should be noted, is also founder of a company that plans to start selling a talking super-toy next year: a robot named Jibo with a cute digitally animated face. Jibo will be able to swivel around in a jolly manner and obey commands like "Jibo, take a picture." She calls him the first "social robot" because he's explicitly designed to encourage families to do things together in the home—not to be an excuse to ignore one another.

"We are not at a point where these things are dangerous and you must avoid them," Ms. Breazeal told me. "We are at a point where there are great opportunities."

### **Little Sister Is Watching You**

Any device that connects to the Internet poses security risks. Same goes for a talking doll. Here a level-headed threat assessment of the dangers

SECURITY RESEARCHERS have made headlines recently by exposing vulnerabilities in two Internet-connected talking dolls—Hello Barbie and My Friend Cayla. In Barbie, they found flaws in its companion app, while in Cayla they showed it would be possible for a hacker with physical access to the doll to later control what it said.

But so far, those risks are theoretical: The makers of the toys, ToyTalk and Genesis Toys respectively, are not aware of any actual breaches and have since fixed the vulnerabilities.

ToyTalk sends all the recordings Hello Barbie makes with a child to cloud servers. Recordings are retained for as long as you use the company's toys, and are deleted two years after your last use. Parents can play each snippet back from a password-protected website, and have the option of deleting all recordings at any time.

Cayla's maker, Genesis Toys, doesn't collect or store any personal data. Instead, it relies on a companion smartphone app with speech-recognition capabilities to figure out what children have said to the toy. When a child asks Cayla a trivia question, the app connects to the Internet to find the answer. Voluntary information that parents can enter using Cayla's companion app to tailor the doll to their child (favorite princess or ice cream flavor) never leaves the phone, according to the company.

Children are one of the groups that are best-protected by American privacy law. The Children's Online Privacy Protection Act, or Coppa, which forbids websites and online services from marketing to children, also places a fairly onerous burden on companies that collect data about those under 13 without explicit permission from parents.

ToyTalk says that's why it never asks for a child's name and that if it notices a child has disclosed identifying details (like an address), the company deletes the recording from its servers.

Protecting data stored on companies' servers is another matter entirely. Earlier this month, digital-learning-toy maker VTech disclosed a data breach that had exposed information about 6.4 million children, including their names, genders and birth dates.

Other thorny questions remain: When companies have access to a child's conversations, are they responsible to disclose if a child talks about abuse? What if police want to know what Barbie heard?

For parents, perhaps the most important thing to watch is how seriously companies take reports of vulnerabilities, and how prominently they feature security information on their websites. The security firm BlueBox, which reported some of Hello Barbie's vulnerabilities, said that ToyTalk fixed many of the problems right away.

And if a toy company doesn't force parents to choose a secure password and change it from time to time, it could be a sign they don't take security as seriously as you do.

### **Speech, Speech! A short history of non-Internet-connected talking dolls.**

*Chatty Cathy Doll, 1959:* While earlier talking-doll designs required children to turn a small crank on the toy, kids could operate Chatty Cathy by pulling a string on her back. A small phonograph record inside the doll enabled her to utter 11 phrases, such as "Please brush my hair."

*Talking Barbie, 1968:* Before the Internet-connected Hello Barbie, there was this pull-string model, whose phrases

included "Would you like to go shopping?" and "I love being a fashion model." A Spanish-speaking version was also available, while Talking Busy Ken ("Barbie's a great cook") was introduced in 1972.

*Speak & Spell, 1978:* This mini computer, designed to teach children how to spell, was among the first speaking toys to use synthesized speech rather than audio prerecorded on a tape or record.

*Teddy Ruxpin, 1985:* This plush bear played prerecorded stories from an internal audiotape. Lip-movement data, stored on the tape's second track, synced the toy's mechanical mouth in time with each word.

*Tickle Me Elmo, 1996:* The holiday-toy sensation would play recorded phrases and vibrate when you squeezed its belly.

*Furby, 1998:* Out of the box, this furry creature spoke gibberish (a language dubbed "Furbish") but over time shifted to prerecorded words, as though it were learning English. In addition to being able to move its ears, eyes and lips, the toy could interact with other Furbies via an infrared port between its eyes.

*Amazing Amanda, 2005:* Amazing Amanda not only had a speech-recognition chip that allowed her to understand children's responses to her, she also used a technology called "voice printing" to recognize a particular child's voice as her "mommy."

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## **Does technology hinder or help toddlers' learning?**

BBC News, By Philippa Roxby, Health reporter, 19 April 2013

Screen time could help children as young as two to learn words and be curious. Children under five years old have an uncanny knack of knowing how to master new technology. From smart phones to tablet computers and game consoles, it is not unusual to see toddlers intuitively swiping screens and confidently pressing buttons.

Even if parents enjoy the momentary peace that comes with handing a small child a gadget to play with, parents secretly worry that this screen time is damaging their brains. But it appears that screens can be beneficial to learning - and the more interactive the experience the better.

Research from the University of Wisconsin, presented at a meeting of the Society for Research in Child Development this week, found that children aged between two and three were more likely to respond to video screens that prompted children to touch them than to a video screen that demanded no interaction.

The more interactive the screen, the more real it was, and the more familiar it felt from a two-year-old's perspective, the study suggested. Heather Kirkorian, assistant professor in human development and family studies, carried out the research and says touch screens could hold educational potential for toddlers. When she did another test on word learning, the results were repeated.

"Kids who are interacting with the screen get better much faster, make fewer mistakes and learn faster. But we're not turning them into geniuses, just helping them get a little more information."

So breathe more easily parents, your toddler is just doing what comes naturally and interacting with the world.

In any case, technology, in the form of phones and tablets, is here to stay. Many primary schools and some pre-schools have introduced iPads into the classroom to facilitate learning. Technology, understanding how things work, and ICT are part of the curriculum.

"I'm not one of those people who think we shouldn't expose children to mobiles, tablets etc," says Helen Moylett, president of Early Education, a charity that aims to improve teaching practice and quality for the under-fives. "They can be really helpful and interesting tools if used in the right place to help us learn - and not all the time, or instead of other things."

However, her main concern is that parents are not always good role models.

"I see parents texting while they walk. Often they are so plugged into their device that it becomes a barrier to communication with their child."

A recent study from Stirling University's school of education found that the family's attitude to technology at home was an important factor in influencing a child's relationship with it. It concluded: "The experiences of three to five-year-olds are mediated by each family's distinct sociocultural context and each child's preferences. The technology did not dominate or drive the children's experiences; rather their desires and their family culture shaped their forms of engagement."

Christine Stephen, study author and research fellow at Stirling, says most parents understand the dangers of addiction and passivity, and set up rules on screen time to make sure that children do a wide range of indoor and outdoor activities.

But there are other experts in the field who disagree. Psychologist Dr Aric Sigman has regularly said that children are watching more screen media than ever, and that this habit should be curbed because it could lead to addiction or

depression. He calculates that children born today will have spent a full year glued to screens by the time they reach the age of seven.

If true, few people would argue that this fact is scary. Yet, if only 9% of UK children do not have access to a computer at home or school, as studies suggest, then screens are pervasive. There is no going back. The key must be for children to use their time in front of them to best advantage by downloading the best apps and the right software to aid their learning.

Jackie Marsh, professor of education at the University of Sheffield, says there needs to be more research done in this area. "We are going to outline what we feel should be the principles for good apps because there is a lack of a central resource for teachers. It's not just a case of giving them the iPad," she says. "It's finding the right quality of apps that's important."

She also maintains that good-quality programs and particular software can help children with learning difficulties develop the skills they are lacking. Online environments can also provide children with a virtual space to develop in confidence - something they might not be able to do in the home or the classroom, she says. Her message to parents is that two hours of screen time each day is enough for children aged six and under. Although there is a minority who consider screens not to be healthy, there is no evidence to suggest they are detrimental, Prof Marsh adds.

Children quickly get bored with one type of media, research suggests, and tend to combine screen time with playing with toys and running around in circles outdoors. "We can get in a terrible panic about this, but toddlers are very curious and savvy," Ms Moylett says. "Children are going to be exposed to all sorts of things."

Perhaps, in the end, they just want to enjoy technology the way adults do.

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## **Traditional Toys May Beat Gadgets in Language Development**

The New York Times, By PAM BELLUCK DECEMBER 23, 2015

Baby laptops, baby cellphones, talking farms — these are the whirring, whiz-bang toys of the moment, many of them marketed as tools to encourage babies' language skills.

But in the midst of the holiday season, a new study raises questions about whether such electronic playthings make it less likely that babies will engage in the verbal give-and-take with their parents that is so crucial to cognitive development.

The study, published Wednesday in JAMA Pediatrics, found that when babies and parents played with electronic toys that were specifically advertised as language-promoters, parents spoke less and responded less to baby babbling than when they played with traditional toys like blocks or read board books. Babies also vocalized less when playing with electronic toys.

"My hunch is that they were letting the baby interact with the toy and they were on the sidelines," said Anna V. Sosa, an associate professor of communications science and disorders at Northern Arizona University in Flagstaff, who led the study.

The study builds on a growing body of research suggesting that electronic toys and e-books can make parents less likely to have the most meaningful kinds of verbal exchanges with their children.

"When you put the gadgets and gizmos in, the parents stop talking," said Kathy Hirsh-Pasek, a professor of psychology at Temple University who was not involved in the new study, but who has found similar effects with e-books and electronic shape-sorters. "What you get is more behavioral regulation stuff, like 'don't touch that' or 'do this,' or nothing because the books and toys take it over for you."

She added, "A toy should be 10 percent toy and 90 percent child, and with a lot of these electronic toys, the toy takes over 90 percent and the child just fills in the blank."

Dr. Sosa said she was surprised by the results. She had expected some parent-baby pairs would talk more with one type of toy, while others would talk more with another.

But the results were consistent almost across the board. When electronic toys were being used, parents said about 40 words per minute, on average, compared with 56 words per minute for traditional toys and 67 words per minute with books.

They also used fewer words that were relevant to the content of the toy, like saying "Oh, that's a piggy," or "That barn is red." Words like that were said over four times as often with books than electronic toys, and more than twice as often with traditional toys than electronic ones.

Dr. Sosa said the results were the same regardless of the sex or age of the baby, and whether the parent (almost all were mothers) was a "chatty" person or not.



“Since the toy was providing some feedback to the baby — if they pushed the button, it did something, it made a noise, it lit up — we think that in addition to sort of letting the toys talk for them, the parents also sort of let the toy interact for them,” Dr. Sosa said.

The study was small — 26 families — and most were white and educated. So the researchers say the results might be different with a larger and more diverse group. But the study is notable because it sought to capture real world parent-child playtime in their homes without researchers watching.

Parents were given three sets of toys: electronic toys including baby laptops, cellphones and a talking farm; traditional toys like blocks and farm animal puzzles; and board books about colors, shapes and animals.

Over three days, parents and babies, who were 10 to 16 months old, played for two 15-minute sessions with each of the sets of toys. The parents were given audio recording devices that were turned on for the full three days, including for the 15-minute play sessions.

Erica Jones, 39, and her son Devin Willy, now 3, participated in the study when Devin was 10 months old.

Ms. Jones, who teaches English composition, said that when Devin was a baby, “I would sometimes talk to fill up the space,” saying “this is an onion” while cooking, for example. But she realized that with electronic toys “if there’s this other noise already there, I didn’t really feel like I wanted to talk. It felt a little bit weird sometimes to talk over the noise.”

Ms. Jones found the researchers’ findings were useful because “the busier I get, the more easy it is to let him play with different electronic toys, and because of the study, it just reminds me to kind of move away from that.”

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## **Before a Test, a Poverty of Words**

By GINIA BELLAFANTE, The New York Times, October 5, 2012

Not too long ago, I witnessed a child, about two months shy of 3, welcome the return of some furniture to his family’s apartment with the enthusiastic declaration “Ottoman is back!” The child understood that the stout cylindrical object from which he liked to jump had a name and that its absence had been caused by a visit to someone called “an upholsterer.” The upholsterer, he realized, was responsible for converting the ottoman from one color or texture to another. Here was a child whose mother had prepared him, at the very least, for a future of reading *World of Interiors*.

Though conceivably much more as well. Despite the Manhattan parody to which a scene like this so easily gives rise, it is difficult to overstate the advantages arrogated to a child whose parent proceeds in a near constant mode of annotation. Reflexively, the affluent, ambitious parent is always talking, pointing out, explaining: Mommy is looking for her laptop; let’s put on your rain boots; that’s a pigeon, a sand dune, skyscraper, a pomegranate. The child, in essence, exists in continuous receipt of dictation.

Things are very different elsewhere on the class spectrum. Earlier in the year when I met Steven F. Wilson, founder of a network of charter schools that serve poor and largely black communities in Brooklyn, I asked him what he considered the greatest challenge on the first day of kindergarten each year. He answered, without a second’s hesitation: “Word deficit.” As it happens, in the ’80s, the psychologists Betty Hart and Todd R. Risley spent years cataloging the number of words spoken to young children in dozens of families from different socioeconomic groups, and what they found was not only a disparity in the complexity of words used, but also astonishing differences in sheer number. Children of professionals were, on average, exposed to approximately 1,500 more words hourly than children growing up in poverty. This resulted in a gap of more than 32 million words by the time the children reached the age of 4.

This issue, though seemingly crucial, has been obscured in the recently intensified debate over the Specialized High Schools Admissions Test, the multiple-choice exam used as the sole metric for entrance into some of New York City’s elite public high schools, including Stuyvesant and Bronx Science.

Thousands of students in the city are in the throes of preparing for the test to be administered the last weekend of this month. Two weeks ago, the NAACP Legal Defense and Educational Fund, along with other organizations, filed a federal civil rights complaint challenging the single-score admissions process as perilously narrow and arguing that it negatively affected black and Hispanic children, who are grossly underrepresented in these schools, so long considered forceful agents of mobility.

As the complaint makes note, of the 967 eighth-grade students offered admission to Stuyvesant for the current school year, only 19 were black and 32 Hispanic. During the previous school year, only 3.5 percent of students at Bronx Science were black and 7.2 percent Hispanic. At Staten Island Tech, the figures were even lower. Mayor Michael R. Bloomberg quickly defended the process, contending that it was so free of subjectivity that it must inherently be regarded as fair.

Others called the system Darwinian. The Education Department, required by state law to rely exclusively on the test,

volunteered defensively that it offered free exam preparation to low-income students. The fact that so many children of means take costly tutorials to ready themselves for testing has always been a matter of concern to anyone hoping to see the racial imbalances redressed.

And yet, all of this focus on the test — which examines reading comprehension, math skills, the ability to reason logically — suggests a myopia of its own. Expanding the ranks of poor black and Hispanic children in the top high schools would seem to require infinitely more backtracking. Consider that Christa McAuliffe Middle School in Brooklyn, one of the major pipelines to top public high schools, last year had a student population that was 0.52 percent black.

As the education theorist E. D. Hirsch recently wrote in a review of Paul Tough's new book, "How Children Succeed," there is strong evidence that increasing the general knowledge and vocabulary of a child before age 6 is the single highest correlate with later success. Schools have an enormously hard time pushing through the deficiencies with which many children arrive.

According to state education data, a far higher percentage of children in New York City charter and district schools in grades three through eight score at the highest level (a four) in math than they do in what is known as English Language Arts. In the 2011-12 school year, only 3.2 percent of children in district schools scored at the four level on the end-of-year statewide English exam. (For charter schools, the figure was 1.9 percent.)

All of this would seem to argue for a system in which we spent ever more of our energies and money on early, preschool education rather than less. The city has taken the right direction with the announcement of a new preschool in Brownsville, Brooklyn, scheduled to open next year, that will start with children as young as 6 weeks old. But that's one program in a city where 7,500 children reached kindergarten this year without preschool preparation. Obviously we want equal opportunity; we also want children to know what words like "equal" and "opportunity" mean.

In recent years there has been growing concern about the "vocabulary gap" widening between children from different socioeconomic groups. By age three, it is believed that children growing up in poor neighborhoods or from lower-income families may hear up to 30 million fewer words than their more privileged counterparts.

There are a broad range of advocates, organizations, and researchers tackling the vocabulary gap between rich and poor children. In this blog post I will discuss the latest research and provide links to some of the various resources parents and caregivers can access if you are interested in expanding your child's vocabulary and shrinking the 'word gap.'

Anne Fernald is a psychology professor at Stanford University who has discovered that the language gap between rich and poor children emerges during infancy.

On February 14, 2014, at the annual American Association for the Advancement of Science (AAAS) conference held at the University of Chicago, Dr. Fernald presented a lecture (link is external) titled "How Talking to Children Nurtures Language Development Across SES and Culture." The presentation brought together over fifty years of research confirming that the children of lower-income parents typically enter school with poorer language skills than their more affluent peers.

According to Fernald, five-year-old children of lower socioeconomic status (SES) score two years behind on standardized language development tests by the time they enter school. In fact, a March 2013 study (link is external) by Fernald and colleagues titled, "SES Differences in Language processing Skill and Vocabulary Are Evident at 18 Months," reported that signs of the vocabulary gap are evident before a child is even two-years-old.

The two factors that most explain the income-related gaps in school readiness are parenting styles and home learning environments. This is actually good news because it means that if we can better equip parents with the knowledge and tools to succeed as their children's first teachers—and mobilize them to act on that knowledge and use those tools—we could see a significant decline in both the vocabulary and school readiness gap.

In October 2013, Hillary Clinton, who is dedicated to closing the vocabulary gap, wrote:

Studies have found that by age four, children in middle and upper class families hear 15 million more words than children in working-class families, and 30 million more words than children in families on welfare. This disparity in hearing words from parents and caregivers translates directly into a disparity in learning words. And that puts our children born with the fewest advantages even further behind. Among those born in 2001, only 58 percent of poor children started school ready to learn, compared to 75 percent of children from middle-income families.

Researchers believe that low-income parents may underestimate by as much as 50 percent the impact that they can have on improving their child's vocabulary and cognitive development. This is why it's so important to get this message out there and to offer simple ways that parents from every socioeconomic background can strive to shrink the vocabulary gap.

When parents understand the long-term benefits of investing time in a child's vocabulary, the more time they invest...

which is the most effective way to close the word gap.

### **The Vocabulary Gap Between Rich and Poor Is Often Established Before Age Two**

Dr. Fernald's research has shown that significant differences in both vocabulary and real-time language processing efficiency were already evident at age 18 months in English-learning infants from higher- and lower-SES families. By age 24 months, there was already a six-month gap between SES groups in processing skills critical to language development.

Fernald and her colleagues at The Center for Infant Studies at Stanford used special technology to make all-day recordings of low-SES Spanish-learning children in their home environments. The researchers found striking variability in how much parents talked to their children.

Fernald suggests that slower processing rates are partly responsible for slower vocabulary growth in the early years. Fernald says that toddlers learn new vocabulary from context, and the faster a child can get at the words he or she knows, the more able the child is to figure out the next word in the sentence and to learn any new words that follow. This is one reason that unplugging the television and reading to young children is so important.

Infants who heard more child-directed speech developed greater efficiency in language processing and learned new words more quickly. The results indicate that exposure to child-directed speech—as opposed to overheard speech—sharpens infants' language processing skills, which creates an upward spiral for learning vocabulary.

### **The Three T's: Tune In. Talk More. Take Turns.**

Dr. Dana Suskind is a Professor of Surgery at the University of Chicago and the Founder and Director of the Thirty Million Words ([link is external](#)) Initiative. Thirty Million Words helps parents enhance their home language environment in order to optimize their child's brain development and, therefore, his or her ability to learn.

Dr. Suskind's ultimate goal, and that of her team, is to help all children reach their full potentials and to close the ever-widening vocabulary and achievement gap. Dr. Suskind has developed a succinct way for parents and caregivers to expand a child's vocabulary based on the Three T's:

Tune In by paying attention to what your child is focused on or communicating with you.

Talk More with your child using lots of descriptive words to build his or her vocabulary.

Take Turns with your child by engaging in his or her conversation.

### **Conclusion: Childhood Socioeconomic Status Is Not Destiny**

Unfortunately, inequities that present themselves in early life can create a ripple effect throughout a person's life. According to researchers, most of the high school achievement gap between poor, middle-income and wealthy students is already visible by kindergarten and the children who have weak pre-literacy and numeracy skills in kindergarten are, on average, the same children with weak vocabulary and math skills in seventh grade.

To combat this phenomenon, Anne Fernald and colleagues at Stanford are now running a parent-education intervention study with low-income Spanish-speaking mothers in East San Jose, California, called ¡Habla conmigo! (Talk with Me!). The study teaches Latina mothers how they can support their infants' early brain development and helps them learn new strategies for engaging verbally with their children.

Although they only have data from 32 families so far, the preliminary results are promising. Mothers in the ¡Habla conmigo! program are communicating more and using higher quality language with their 18-month-olds compared to mothers in a control group.

"What's most exciting," said Fernald, "is that by 24 months the children of more engaged moms are developing bigger vocabularies and processing spoken language more efficiently. Our goal is to help parents understand that by starting in infancy, they can play a role in changing their children's life trajectory."

In previous research on caregivers' speech to Spanish-learning children, Fernald's group found big differences in levels of parental engagement even within a disadvantaged group of families. Those lower socioeconomic status kids who heard more child-directed talk got faster in processing and learned language more rapidly, according to Fernald.

"It's clear that SES is not destiny," Fernald concludes. "The good news is that regardless of economic circumstances, parents who use more and richer language with their infants can help their child to learn more quickly."

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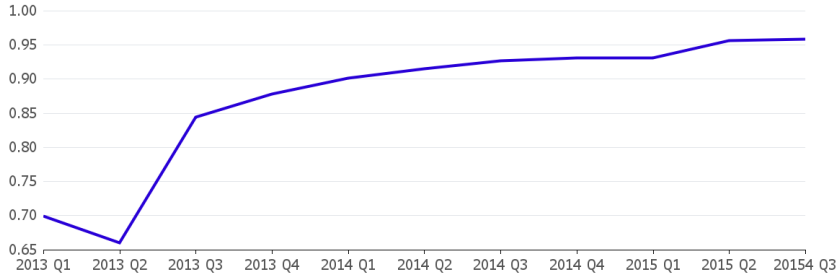


# Why 2015 Was a Breakthrough Year in Artificial Intelligence

Bloomberg News, by Jack Clark, December 8, 2015

## Computers Get Better at Browsing the Web, with AI

Startup Diffbot has used AI to increase the accuracy of its data scraping tools

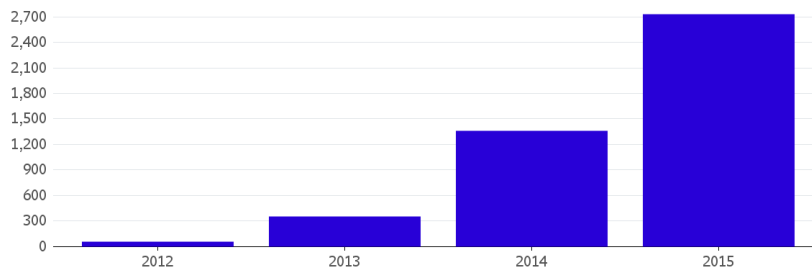


Source: Diffbot

Bloomberg

## Artificial Intelligence Takes Off at Google

Number of software projects within Google that uses a key AI technology, called Deep Learning.



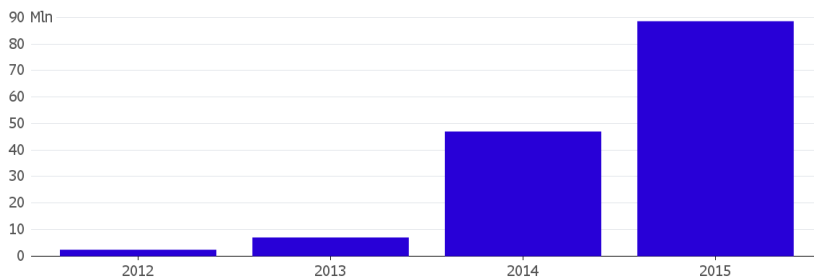
Source: Google

Note: 2015 data does not incorporate data from Q4

Bloomberg

## Companies Buy More Data to Build AI Systems

In 2012 tech startup CrowdFlower sold around 2 million spreadsheet rows of data to customers to use to train AI systems. This year it sold almost a hundred million.



Source: CrowdFlower

Bloomberg

Computers are “starting to open their eyes,” said a senior fellow at Google.

After a half-decade of quiet breakthroughs in artificial intelligence, 2015 has been a landmark year. Computers are smarter and learning faster than ever.

The pace of advancement in AI is “actually speeding up,” said Jeff Dean, a senior fellow at Google. To celebrate their achievements and plot the year ahead, Dean and many of the other top minds in AI are convening in Montreal this week at the Neural Information Processing Systems conference. It started in 1987 and has become a must-attend event for many Silicon Valley companies in the last few years, thanks to the explosion in AI. NIPS was where Facebook Chief Executive Officer Mark Zuckerberg chose in 2013 to announce the company’s plans to form an AI laboratory and where a startup named DeepMind showed off an AI that could learn to play computer games before it was acquired by Google.

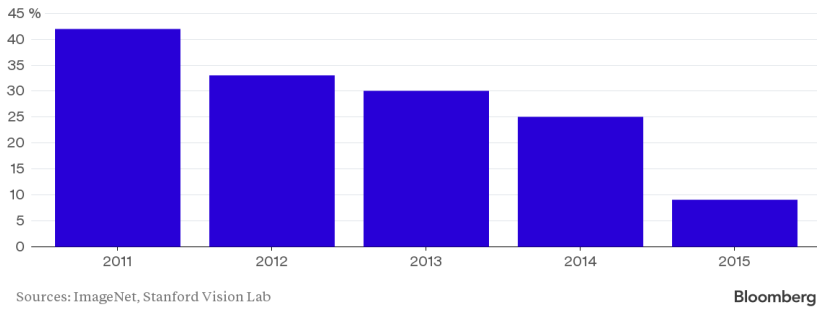
There should be plenty to discuss this week. The unprecedented advancements in AI research this year can be attributed to a confluence of nerdy factors. For one, cloud computing infrastructure is vastly more powerful and affordable, with the ability to process complex information. There are also more plentiful datasets and free or inexpensive software development tools for researchers to work with. Thanks to this, a crucial class of learning technology, known as neural networks, have gone from being prohibitively expensive to relatively cheap.

That’s led to rapid uptake by the tech industry’s largest companies, including Google, Facebook, and Microsoft. Each operates its own AI lab that conducts important research in the field and publishes much of it for the academic community to build upon. This year, Google researchers nabbed the cover of scientific journal Nature with a system that can learn to play and master old Atari games without directions. Facebook built a way to let computers describe images to blind people; Microsoft showed off a new Skype system that can automatically translate from one language to another; and IBM singled out AI as one of its greatest potential growth areas.

Startups are also contributing meaningfully to AI. Preferred Networks is making AI systems that will go into industrial

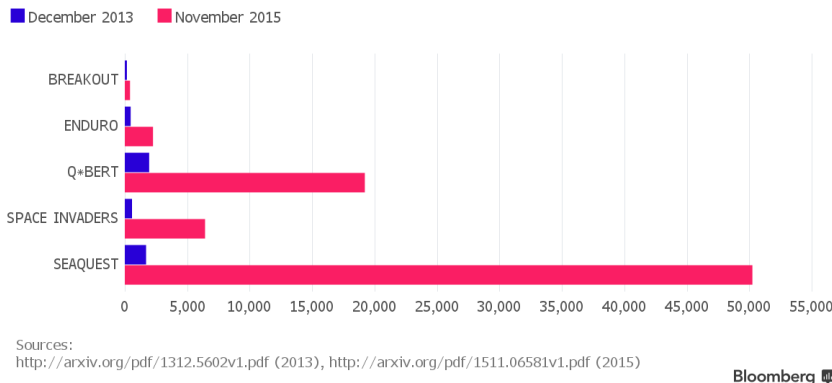
### AI Learns to Pin the Tail on the Donkey

Computers are getting better at figuring out where in a picture a specific object is, with error rates dropping in recent years.



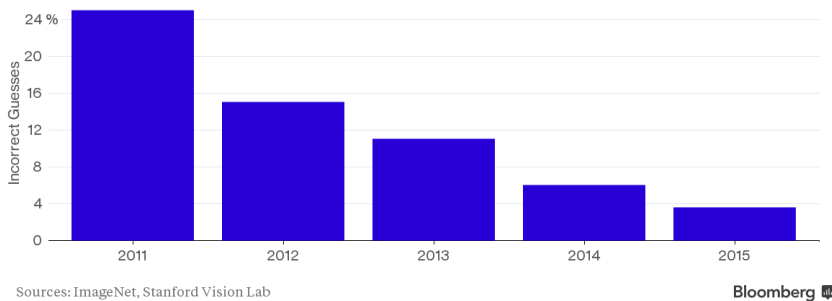
### Play It Again, HAL

Google researchers have spent the past two years working out how to help their AI systems master old Atari games, and their systems have got much, much better.



### Computers Stop Squinting and Open Their Eyes

Error rates on a popular image recognition challenge have fallen dramatically since the advent of deep learning systems in the 2012 competition.



version of the real world, such as the simplified environments presented in video games, then ask them to explore it and record the results. (Check out the chart above for a look at how far Google's Atari project has come since 2013.) But the potential goes beyond games: Similar software could be used to teach things to AI computers and help them more quickly learn such new things as medical diagnostics, environmental science, or improved personal recommendations.

Google's Dean likens recent advancements in AI capabilities to evolution. "We're at this point in actual evolution where, previously, animals didn't have eyes, and now they have eyes," he said. "That's going to change a lot of stuff. Computers used to not be able to see very well, and now they're starting to open their eyes."

robots made by Japan's Fanuc, and Indico Data Labs worked with a Facebook researcher to teach a computer how to paint faces using its own sort of imagination.

For a look at how far computer intelligence has come this year, here are six charts that should give you a clearer picture.

Computers have become a lot better at figuring out what's in a photo. In 2012, a team of University of Toronto researchers won the world's top image-recognition competition. The entire team was eventually recruited by Google, and its approach was quickly adopted by the company and its peers. In 2015, AI systems based on the project's approach, which relies on a technique called deep learning, have become much more accurate. In tests, error rates are down to less than 5 percent, making them better than some humans' performances.

Lots of companies are embracing AI, perhaps none more than Google. The Internet giant went from sporadic usage of deep learning in 2012 to applying it to thousands of projects this year.

Startups are adopting AI in big ways, too. CrowdFlower, which supplies structured data to companies, said it has seen a dramatic uptick in the amount of data being requested by businesses to help them conduct AI research. DiffBot, another startup, is using AI to improve its automated data-scraping tools.

A main focus of AI research is in teaching computers to think for themselves and improvise solutions to common problems. One way to do that is to give them a slimmed-down