

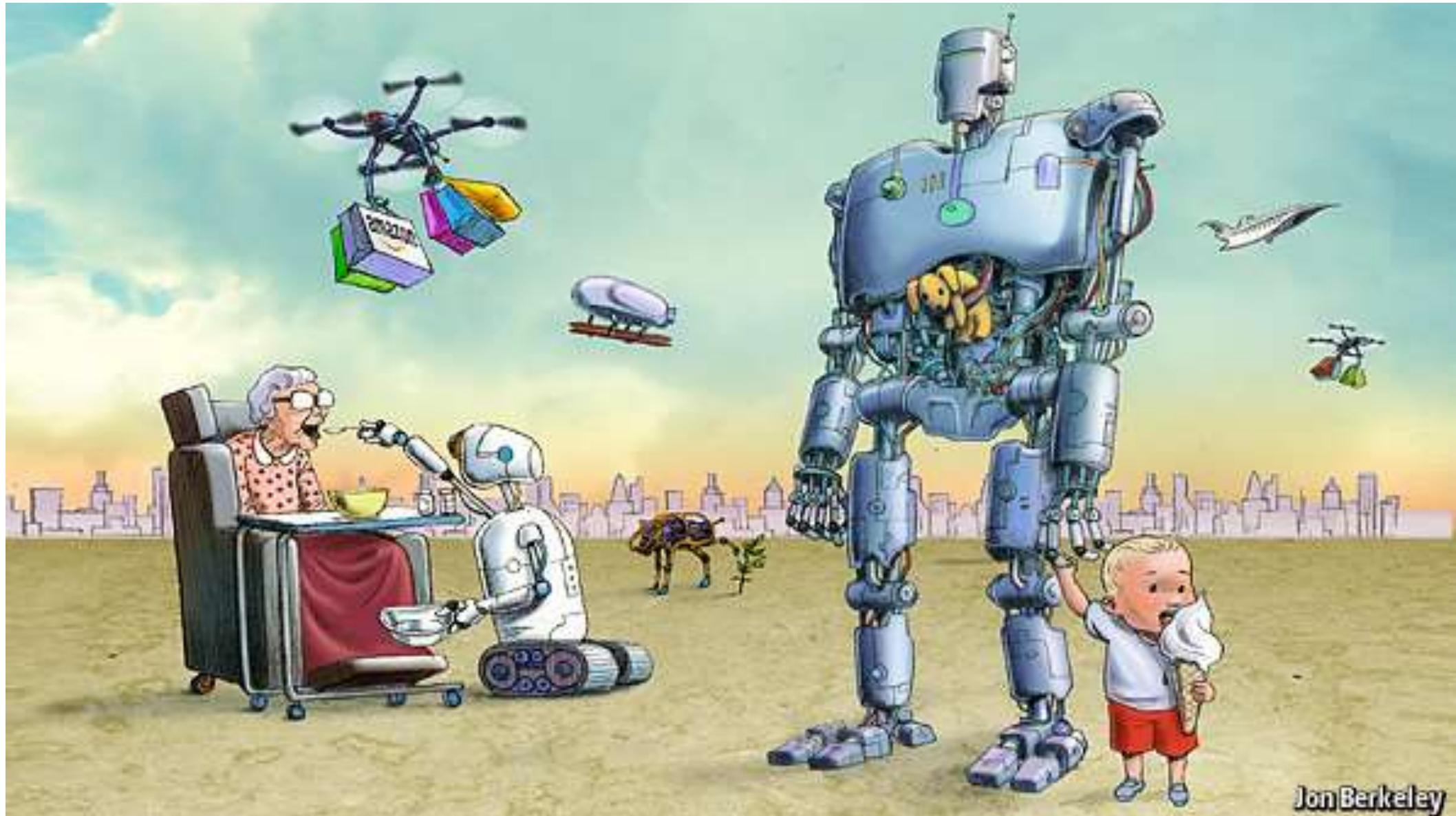
Robot Therapy for Children with Autism Spectrum Disorder

**AT Solutions Lab
Learning Disabilities Association of America**

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Robot Therapy for Children with ASD

New Statistics from the US Center for Disease Control:

1 in 68 children identified with autism spectrum disorder (ASD) during 2010 – 2012. Similarly in England.

ASD is reported to occur in all racial, ethnic, and socioeconomic groups

ASD is almost 5 times more common among boys (1 in 42) than among girls (1 in 189)

Case Study: Edgar's parents want him to learn to order items off a menu at a restaurant



Two Therapy Sessions with Edgar

	Sequence of Behaviors	Results
Session 1 2/16/14	Introductory behavior (Hello Edgar. How are you? Good to meet you...)	Edgar is immediately drawn to the robot and is happy.
	Imitation behaviors, e.g. raising hands, waving, sitting, wiping forehead, and others, with everybody in the room imitating the robot	Edgar withdraws, going to a corner to play a video game. Subsequently, everybody is asked to leave the room except Edgar's mother, his siblings, and the robot operator.
	(unplanned) The robotic version of the music game Simon was introduced by the robot operator	Edgar's siblings begin playing the game, Edgar is drawn to it and begins playing the game as well.
	The ordering doughnut behavior	Edgar imitates the behavior "Can I please have a chocolate glazed doughnut" several times albeit softly and without confidence.
Session 2 2/22/14	Introductory behavior, reinforced with encouragement to speak loudly and clearly and make eye contact	Edgar is attentive and eager. Only Edgar's father, Kristen, and the robot operator are in the room.
	The music game, this time planned	Edgar has a blast. He speaks loudly, and begins asking for the doughnut routine unprovoked.
	The ordering doughnut behavior, modified to encourage speaking loudly and clearly, making eye contact, and saying Thank You.	Edgar repeats the phrase "Can I please have a chocolate glazed doughnut" several times loudly and clearly, and practices Thank You.

Robot Therapy and Systemic Thinking

The system is an organization consisting of the following interrelated entities: the ASD child, parents, siblings, educator, therapist, roboticist, behavior designer, and robot operator.

It is a soft system involving stakeholders of different mindsets

It is an evolutionary system whose structure and interrelations change over multiple sessions with the child

It iterates over preparation, execution, and post-analysis where post-analysis informs subsequent preparation for the next iteration

Participants in Session 1 Preparation in yellow

Edgar	Mother	Father	Sibling 1	Sibling 2	Humanoid Robot
Experimental Psychologist	Behavior Designer	Behavior Implementer	SPED Professor	SPED Student	Robot Operator

Participants in Session 2 Execution in yellow

Edgar	Mother	Father	Sibling 1	Sibling 2	Humanoid Robot
Experimental Psychologist	Behavior Designer	Behavior Implementer	SPED Professor	SPED Student	Robot Operator

Conclusion

The work benefits from systemic thinking, but ...

Our results are anecdotal, i.e. a one-shot experiment.

A more scientific experiment is underway with a larger sample and with an experimental psychologist and speech/language pathologist.

Our ultimate goal is to outline a practical, effective methodology for a professional service that would benefit ASD children and their families.



Thank you