OVERVIEW - COMMENTARY

TECHNOLOGY RESEARCH & EXPLORATION

THROUGH THE DIVERGENT LENS

COMMENTARIES TO EXPLORATION, RESEARCH AND DESIGN THROUGH THE LENS OF (NEURO)DIVERSITY & ACCESSIBILITY

Overview

Introduction - research through the divergent lens

At least 1 in 6 people living with one or more neurological conditions, 1 in 7 are neurodivergent (asperger's syndrome, rett syndrome, childhood disintegrative disorder, kanner's syndrome, and pervasive developmental disorder). 1 in 4 adults -- suffers from a diagnosable mental disorder in a given year. Consequently, the introduction of accessibility and inclusive design principles was critical to making workplaces, classrooms, cities and ecosystems accessible for millions of individuals presenting abilities, talents, physical and cognitive patterns that were excluded before. Though, this emerging work still requires a lot of advancement across the areas of algorithmic research, technology transfer, adoption and frameworks. In particular, until 2019 there were no frameworks focused on research and development targeting artificial intelligence and disability, until 2020 - artificial intelligence and children. At the same, the neurodivergent technology research and deployment presenting the intersectional spectrum brings even more challenges and questions.

To date, the ecosystem of technologies and solutions targeting neurodivergent individuals and/or individuals with similar or related psycho-neurological conditions is complex and sophisticated. It includes AI-driven hiring platforms, social robots in classrooms, smart glasses for emotion recognition, speech recognition apps, eye-tracking, biofeedback, virtual and augmented reality for emerging education, data analytics dashboards, various assistive and tracking devices and other solutions.

Criteria and mechanisms behind this ecosystem encompass technology, medicine, social, economic and demographic criteria, bioethics. it includes the type of the spectrum, ability and comorbidity, gender, sensibility, physical and tactile experiences, visual and color experiences, differences in the systems of learning, memorizing, systemizing, empathizing, mechanisms of caregivers, human involvement, safety and privacy.

This complex of criteria becomes the foundation for not only the design research but also transparent and biasless development and deployment of AI systems, which use training data across a variety of criteria, taking into account possible correlation, fluctuation short and long-term effects.

Towards human-centered research and criteria

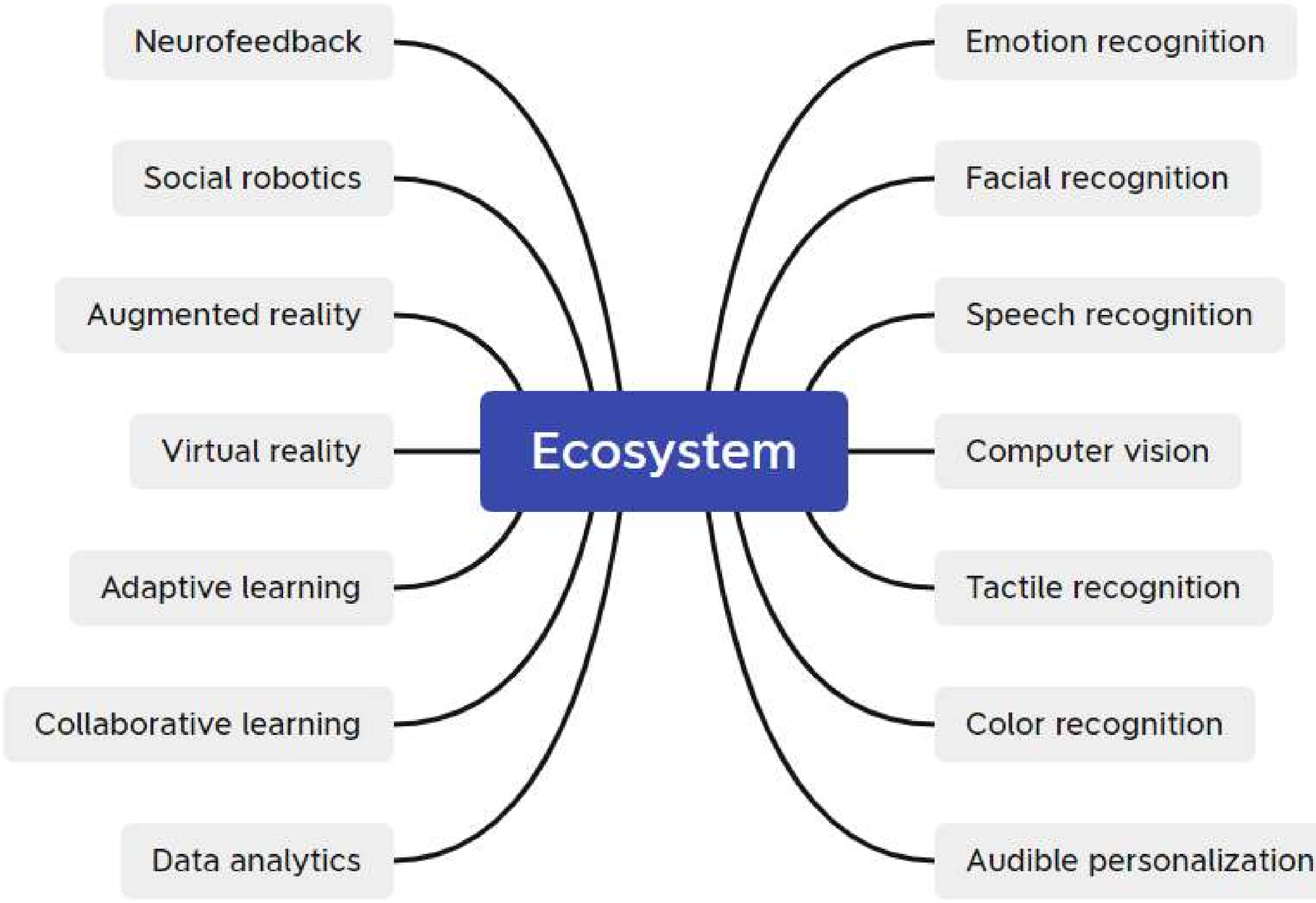
This commentary has a goal to further improve research, design and deployment mechanisms for AI systems, technologies and solutions targeting both neurotypical and neurodivergent individuals, including related groups, comorbid conditions, impairments and differences. It also aims to expand our vision of accessibility, cognitive and neuro differences across the population, provides perspectives on additional criteria such as gender, intersectionality, social, economic and demographic criteria, providing additional lenses of complexity to the research and exploration process.

It primarily targets researchers, technology practitioners, developers, professionals involves in public or private innovation, accessibility and diversity-related technology research, development and deployment.

Special gratitude

We'd love to express our constant gratitude to our peers and fellows who inspire our work over the years: the European Commission, AI4EU, Women In AI, Tania Duarte and London Tech Disability working group, Leena Hague and BBC Cape, Dr Nancy Doyle and Genius Within, Ashley Peacock and Passio, Peter Horsley and Remarkable, Tiffany Yu and Diversability, our global technology circle of innovators presenting technologies in the field of accessible AI, robotics, data analytics, speech recognition, facial recognition, computer vision etc.

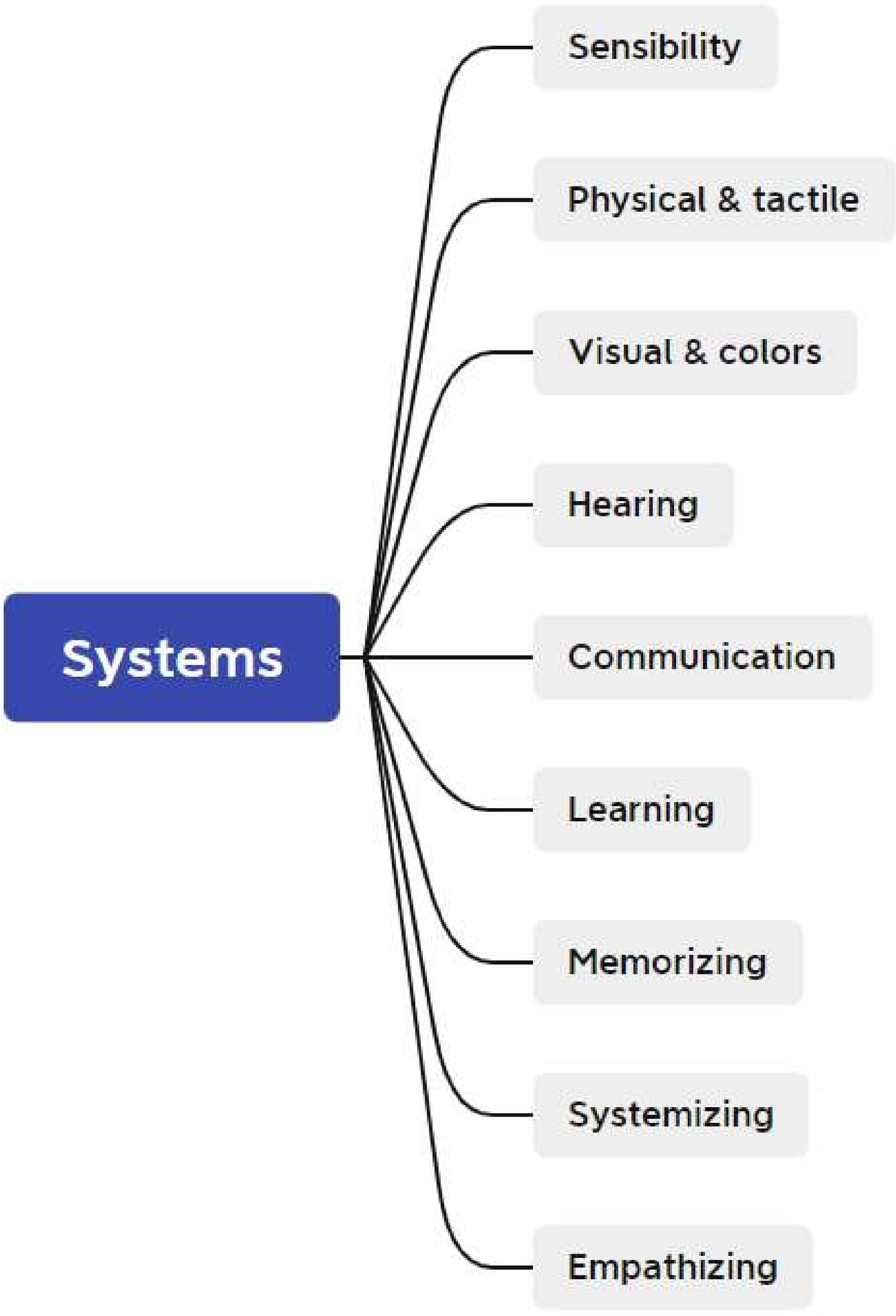
Ecosystem and modularity



**Ecosystem & modules scheme (technologies and sensory algorithms)*

Solutions targeting divergent individuals tend to become modular ecosystems, where elements are interchanged, interconnected, analyzed through aggregated dashboards and analytical systems. Stakeholders involved in data input are multiple, including individuals themselves, families, parents, caregivers, counselors, researchers and educators.

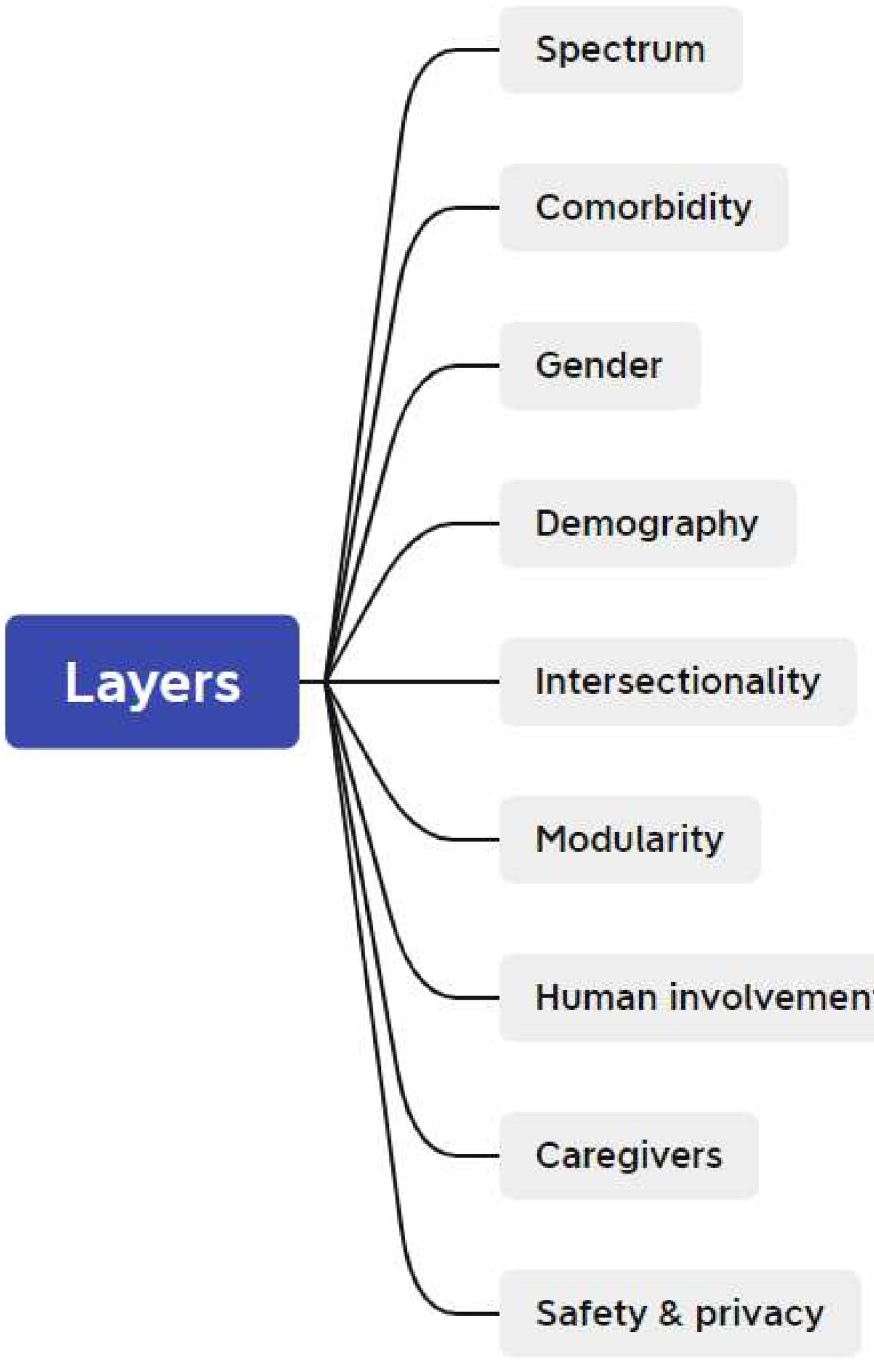
Systems & perception



**Sensory and perception systems scheme (examples)*

Solutions target multiple sensory, cognitive, motoric and vital systems. Depending on the spectrum, comorbidities and additional layers, particular systems may prevail over others (ex. sensibility, memorizing, systemizing). Extracted data are used as a source for training data for machine learning algorithms or insights for design and development process.

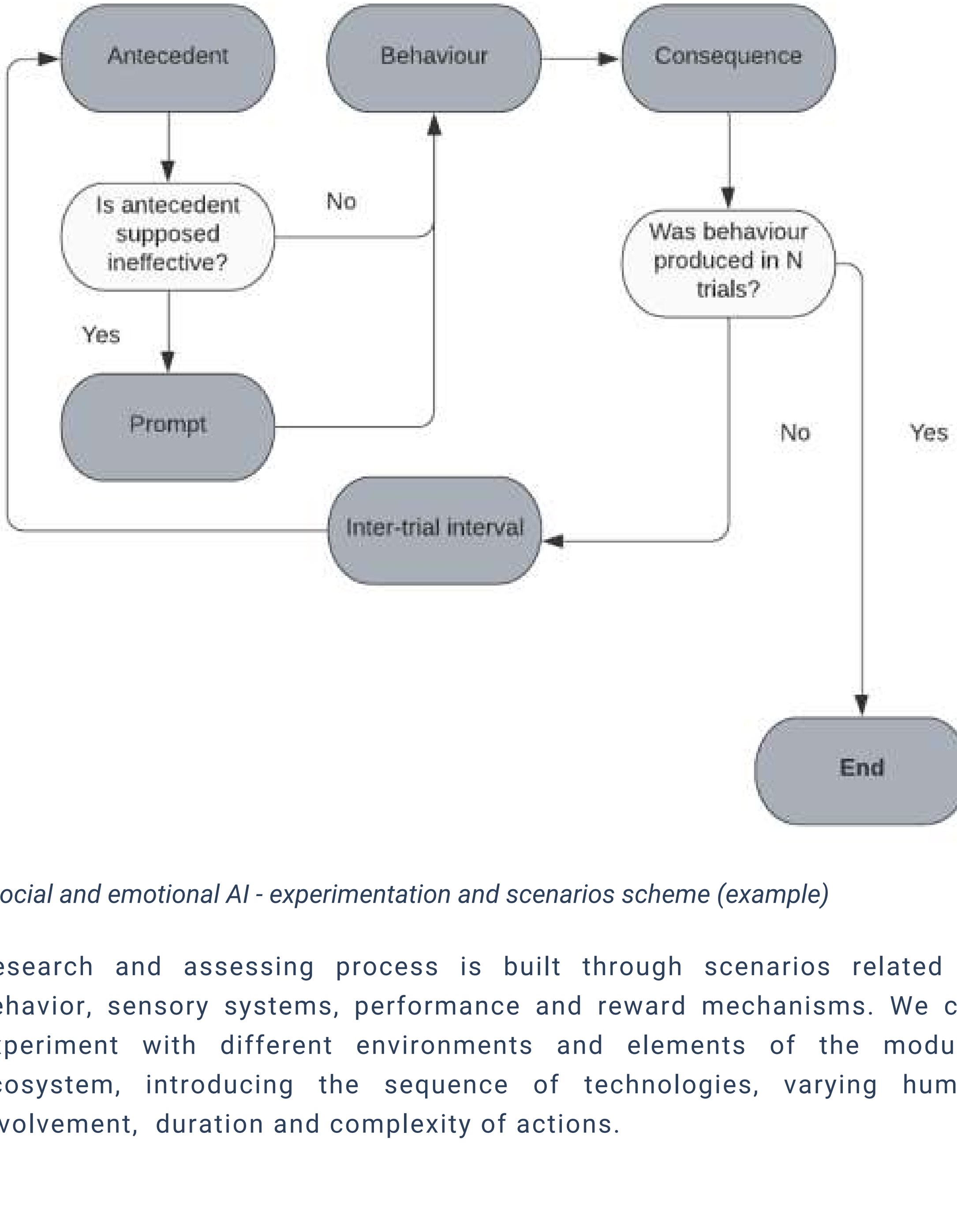
Research layers



**Research layers, primary and secondary criteria scheme*

Along with the systems, our research process involves additional layers, criteria and considerations, including the type of the spectrum, underlying conditions and comorbidity, gender, demography, intersectionality, modularity, human involvement, caregivers ecosystem, safety and privacy.

Experimentation and scenarios



**Social and emotional AI - experimentation and scenarios scheme (example)*

Research and assessing process is built through scenarios related to behavior, sensory systems, performance and reward mechanisms. We can experiment with different environments and elements of the modular ecosystem, introducing the sequence of technologies, varying human involvement, duration and complexity of actions.

Experimentation and validation

Required response	Touch the robot if it is your turn and if the robot is lit up in blue
Antecedent	1. Sit facing the child, and place the robot between you. The robot is active and lit up either in blue or red.
Behavior	2. If the robot's light is blue say "The robot is blue! Touch it!. 3. If the robot's light is red say "The robot is red! Don't touch it!". 4. If the robot's light is red and the child reaches to touch it, the educator will block the gesture, saying "The robot is red! Don't touch it!" 5. If the robot's light is blue and the child does not attempt to touch it, the educator selects a guidance specific to the child (ex. The light is blue, you can touch it). 6. If the robot lights up in blue and the child touches it, the robot light up in white for a moment.
Consequence	6. After an errorless sequence of six turn-takings, the robot provides a sensory reward (specific to each child) and the educator gives verbal praise.
Validation Criterion	7. Repeat the sequence of turn-takings 5 times in a row (30 trials in all) Go to the next lesson if the child has produced a correct turn-taking sequence four times out of five.

**Social and emotional AI - scenarios, questions, responses and evaluation (example)*

During experimentation, we work with a variety of scenarios, proposed actions, responses, relative evaluation and weight depending on the type of systems and layers involved and measured. Our goal is to evaluate alignment with scenarios, primary and secondary actions, short and long-term effects, potential negative impacts.

Variables, fluctuations and normalization

$$Normalized.Proportion = 2 \times \left(\frac{x_{robot}}{x_{robot}+x_{ball}}\right) - 1 \qquad (1)$$

$$\begin{cases} 1 \quad if \quad x_{robot} > x_{ball} \\ 0 \quad if \quad x_{robot} = x_{ball} \\ -1 \quad if \quad x_{robot} < x_{ball} \end{cases} \qquad (2)$$

**Variables, fluctuations and normalization of the data input and research (example)*

There is a complex question related to variables and fluctuations within the data spectrum. On the one hand, due to a variety of the involved systems and layers, on the other hand, due to multiple stakeholders and active users involved in data input. Data correlation and normalization are necessary to obtain reliable insights.

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Spectrum

The future of technology is non-binary – there is no same brain or cognitive pattern, but an infinite spectrum of symptoms and combinations.

Similar to the fact neurotypical individuals have different abilities related to listening, reading, memorizing, preferrable ways to learn and communicate, (neuro)divergent individuals are infinitely different from each other. Typically, we consider it in the context of social communication and interaction, cognitive and learning abilities, sensory systems, comorbid conditions and many other criteria. The "spectrum" approach is critical to accessible research in general as well, including the degree of a visual or hearing impairment, limitations related to interface control and data input, control and interaction.

Another critical niche for such an approach is mental health, identified by the spectrum of neurotransmitters and monoamines, where we clearly identify common and different patterns between conditions by a parameter (anxiety, mood, cognitive ability, focus and concentration, social functioning, motivation etc) it's recommended to create a framework of comparative "quadrant" which will help to see and better understand degrees of differences.

Ability and comorbidity

Disabilities and chronic disorders are often associated with comorbidity (the presence of one or more additional conditions often co-occurring with a primary condition). For instance, between 25 and 40% of people with learning disabilities also experience mental health problems. 37.6% of people with severe symptoms of mental health problems also have a long-term physical condition. It may include digestive, cardiac, endocrine and neuromuscular systems disorders.

Moreover, comorbidity is much more common among neurodivergent individuals. For example, patients with autism are 1.6 times more likely to have eczema or skin allergies, 1.8 times more likely to have asthma and food allergy, 2.1 times more likely to have frequent ear infections. There is a variety of additional underlying conditions that directly affect the way how divergent individuals interact with environments and interfaces, including sensory sensibility, visual impairment; color impairment, hearing impairment, speech impairment, functional and mental differences.

It means the necessity to provide our research with additional questionnaires that identify underlying and additional conditions, its degree, severity and duration, influence on the main behavioral criteria.

Gender

Autism spectrum disorder (ASD) is identified in females at a substantially lower rate than in males, with most epidemiological studies reporting approximately a 4:1 male to female ratio (Fombonne 2009). Though, there is a reason behind such statistics.

Behavioral and preliminary neuroimaging findings suggest autism manifests differently in girls. Notably, females with autism may be closer to typically developing males in their social abilities than typical girls or boys with autism.

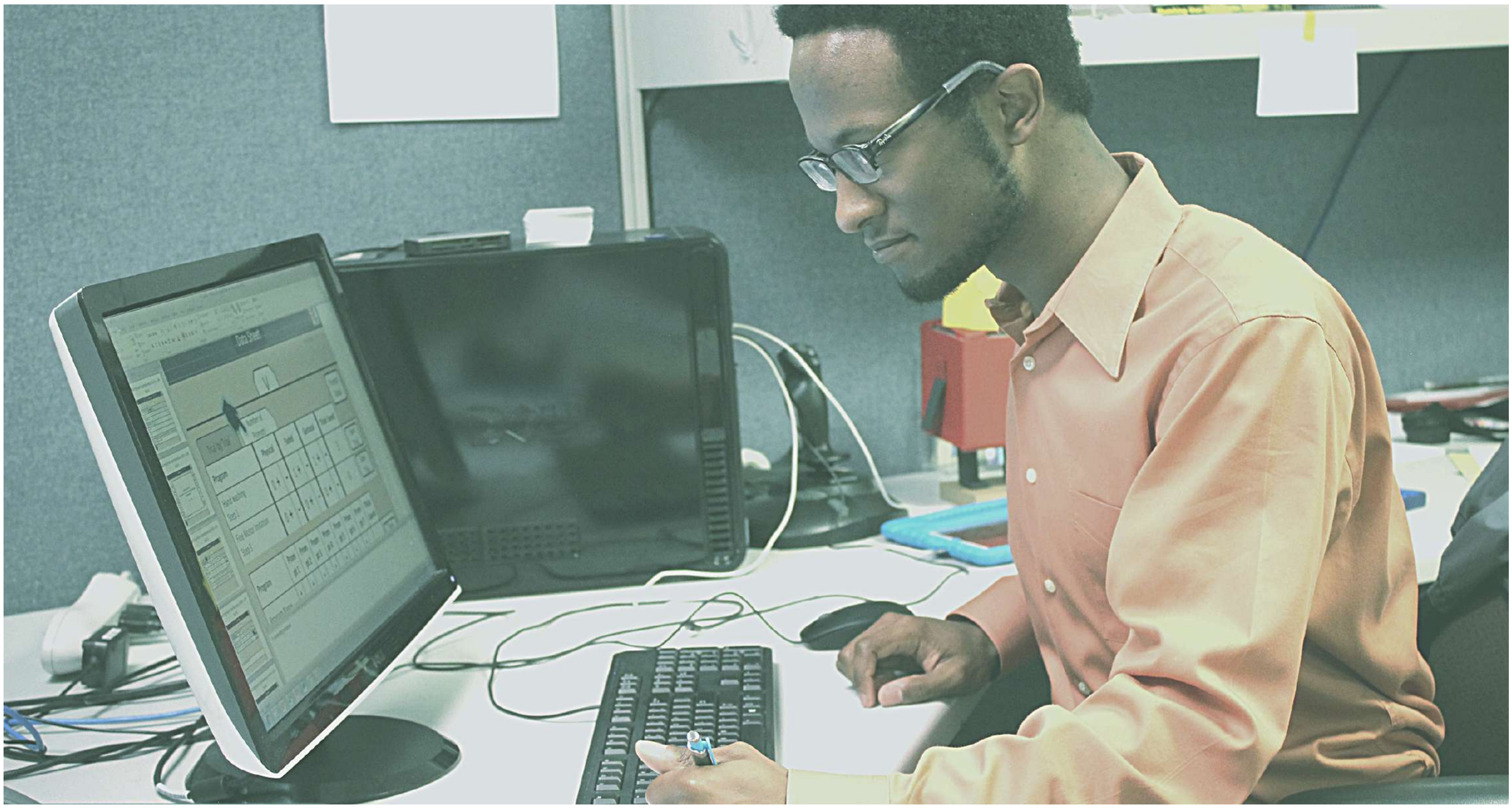
Girls with autism may be harder to diagnose for several reasons, including criteria developed specifically around males and overlapping diagnoses such as obsessive-compulsive disorder or anorexia.

It means the necessity to distinguish research approaches and criteria for people of different genders, including separate questionnaires, involvement of internal professionals, focused on gender studies and / or aspects of the conditions through the gender lens.

Intersectionality

Intersectionality is an analytical framework for understanding how aspects of a person's social and economic identities combine to create different modes of discrimination. Over recent years, most the technology solutions were created with the same type of men, not only limiting representation internally but also externally - primarily focusing on particular communities, middle and privileged social classes, automatically excluding traditionally marginalized groups and social quartiles. For instance race, economic status, social group or origin may affect whether a particular individual is properly diagnosed, get a proper perception, support and/or social integration. For instance,In a study of 174 toddlers, it was found white parents of autistic children were 2.61 times more likely to report any social concerns to their child’s pediatrician than Black parents (Georgia State University, 2017). These parents were also 4.12 times more likely to report concerns about rigid/repetitive behaviors (Georgia State University, 2017).

It means that during our research that we don't consider "neurodiversity" or "disability" as a singular identity, but see it through the lens of economic and social criteria (seeing social, economic and demographic quartiles behind it), that may add "double" burden, additional challenges of identification and research.



Access and research

Unemployment among those with autism is approximately 85%, severe mental health disorders - 68%-83%, Down syndrome - 43%. In general, individuals with cognitive, social or mental impairment have the lowest employment rates and higher social isolation rates than people with other disabilities.

It means that divergent individuals are isolated not only from job and learning opportunities but also from opportunities to contribute to research - most of the product researches related to the latest technologies are mostly based on healthy working middle-class. Thus in order to ask questions - you should address them in the right places - communities, educational centers, workplaces and ecosystems that actually involve these groups.

Another aspect is social and economic access when groups of particular groups and quartiles are historically excluded from representation (economically, socially and politically excluded groups, ethnical minorities, groups with underlying disabilities and conditions). It means that you not only should address your questions across appropriate places but also use appropriate language, terminology, cultural and social aspects in a particular group.

Modularity

Modular design, or modularity in design, is a design principle that subdivides a system into smaller parts called modules, which can be independently created, modified, replaced, or exchanged with other modules or between different systems.

From accessibility and diversity perspectives it means not only compatibility between solutions or but also contraction. For instance, examples of such solutions include AI-driven hiring platforms, social robots in classrooms, glasses for emotion recognition, speech recognition, eye-tracking, biofeedback, virtual and augmented reality, data analytics dashboards, various assistive and tracking devices.

Similar to an understanding of the "spectrum", our research should clearly identify accessibility and diversity solutions as modular ecosystems, where we aim to achieve synergy, inter functionality, data and insights exchange, transparent and biasless cross-deployment. It means more complex research across related solutions, possible contradictions, data input, connection and exchange, security and privacy.

Sensebility

Up to 90 percent of people with autism are either overly sensitive to sound, sight, taste, smell or touch, or barely notice them at all. Some seek out sensations by, for example, spinning in circles or stroking items with particular textures. Since 2013, the “Diagnostic and Statistical Manual of Mental Disorders” has included sensory sensitivities in the list of diagnostic criteria for autism.

During pandemics, such solutions as zoom became widely popular across tech ecosystems and communities. Though, we very quickly explored that such an affordable way to connect individuals may be harmful for particular groups. For instance, during our recent neurodiversity panel most of the participants mentioned that they found standard "come in" sound overly loud and annoying. At the same time, during over meeting, we preferred to not use video at all, prioritizing text exchange.

Thus, your research should clearly identify the groups of sensibility, exclude or personalize particular signals, prioritize particular formats and environments (ex. - text only, no sound).

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Physical & tactile

With a growing variety of wearables, input interfaces, devices and dashboards, there is a question, how we properly identify an individual's tactile ability, differences in tactile sensibility and neuromotor activation to better understand gaps and personalize differences.

Along with many neuromuscular disorders, recent studies confirm that tactile impairment is universally present in neurodivergent individuals and describe a distinguishing clinical presentation characterized by mixed pain and numbness on multiple areas of skin including the face, mouth, hands, and feet. Tactile impairment is severe compared with other developmental disabilities and associated with delay of early self-regulation milestones. The presentation is typical of early-onset sensory neuropathy.

Moreover, a tactile impairment may be associated with aging, endocrine disorders such as diabets. It means the necessity to leverage appropriate design thinking and access patterns that simplify the user flow, data input, control and management.

Visual & colours

A critical part of the sensibility is visual and color perception. We can use color to help influence our emotions and ability to cope, by wearing color, surrounding ourselves with color, visualizing color etc.

Though, Significant differences in the accuracy of both color memory and color search were found between neurodivergent children and controls matched on non-verbal cognitive ability and age. Neurodivergent children were significantly less accurate at color memory, detecting chromatic targets presented on chromatic backgrounds than controls. General instructions recommend that gull intensity colors should be avoided. Red should never be used in the home as children with ASD perceive the color as fluorescent. Yellows likewise are very stimulating and are best to avoid. Greens, blues, pinks, soft oranges and neutrals can be very comforting.

Despite general recommendations, it's critical to include color patterns into our accessibility and design research, creating groups and subgroups depending on the main condition, comorbidity, additional data and characteristics of individuals.

Interaction and communication

People with autism have challenges with communication and social skills. Roughly 25 percent of people with autism speak few or no words. A generation ago, that figure was closer to 50 percent. Besides, they often find it hard to have conversations and may not pick up on social cues. Some people with autism may not talk at all, and others may talk very well. But all will have some challenges making friends and communicating socially.

The fact that neurodivergent individuals communicate differently affects the way how we design our interface, provide push notifications or support systems. For instance, we can prioritize text exchange over verbal/sound communication, we may reduce or exclude zoom/video interaction from our interface, we also should address specific differences of individuals based on the spectrum / cognitive parameters.

During our research, it's important to prioritize usability and live-interaction tests, consider different scenarios and behavior patterns taking into account such criteria as gender and demography.

Attention

Around 1 in 10 people have differences in attention, focus and / or conditions related to attention deficit. As a part of the spectrum, neurodivergent individuals are frequently marked by symptoms consistent with attention-deficit/hyperactivity disorder (ADHD), namely inattention, hyperactivity, and impulsivity. About half of the ASD population also meets diagnostic criteria for ADHD. Such individuals are typically associated with cognitive differences in social processing, focus span and duration, adaptive functioning, and executive control.

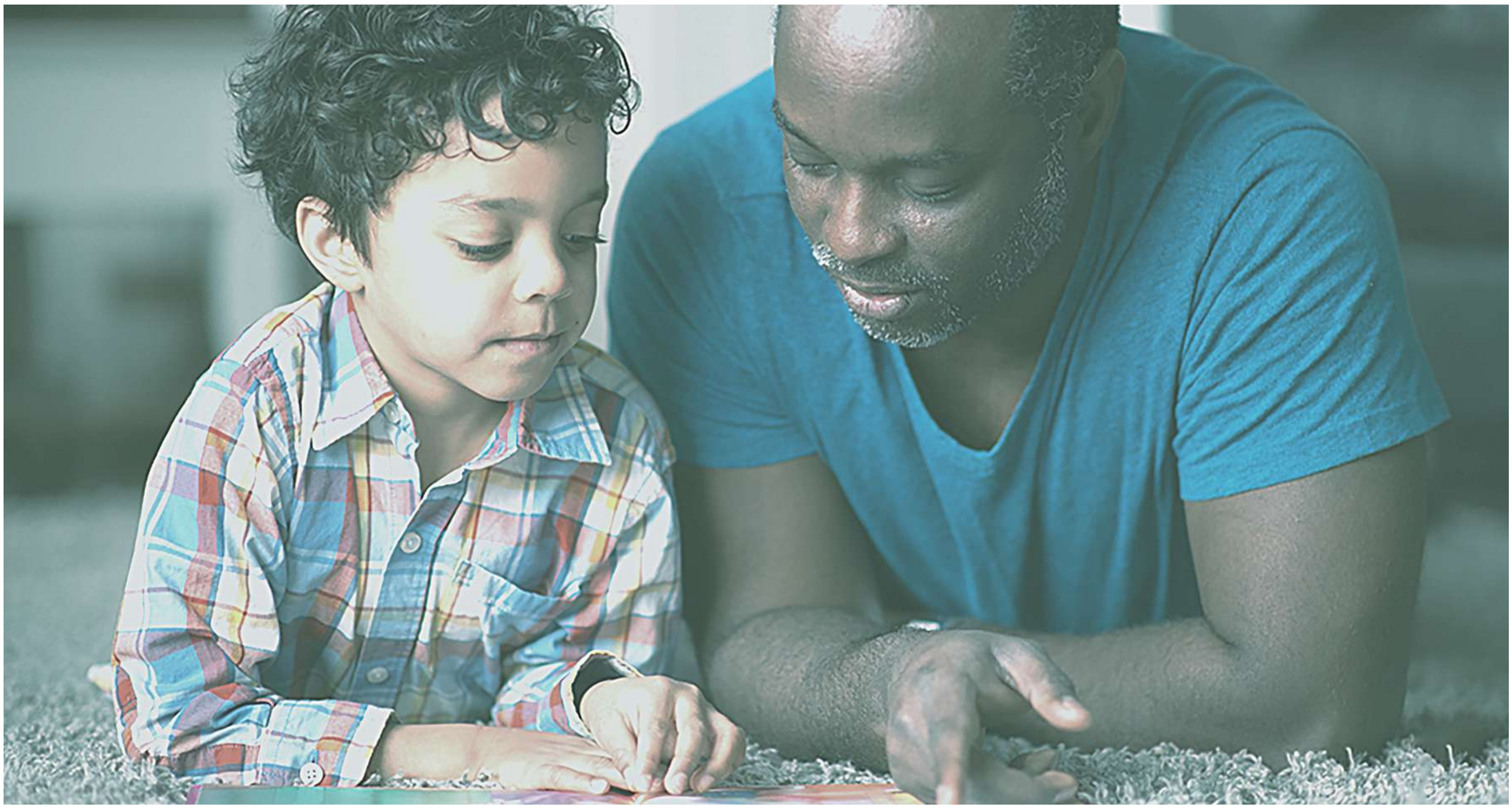
For instance, some neurodivergent children can find it difficult to pay attention to and focus on things that don't interest them (cognitively indifferent), specifically in short-term span and shared-activity type of action (ex. reading). At the same time, they can keep their attention on things they are cognitively involved in for long periods of time.

From a research perspective, it means work with scenarios and experimentation with short and long-term span actions, measurement of relative durations and ranges, immediate and postponed responses, performance and reactions.

Learning

‘Learning styles’ is a concept which attempts to describe the methods by which people gain information about their environment. People can learn through seeing (visually), hearing (auditorily), and/or through touching or manipulating an object (kinesthetically or ‘hands-on’ learning). For example, looking at a picture book or reading a textbook involves learning through vision; listening to a lecture live or on tape involves learning through hearing; and pressing buttons to determine how to operate a VCR involves learning kinesthetically.

For instance, If a neurodivergent child talks excessively, enjoys people talking to him/her, and prefers listening to the radio or music, then he/she may be an auditory learner. Our goal is to identify such patterns and use them to build an appropriate learning curve, which, for instance, prioritize visual, hearing or text recognition. It also affects what types of algorithms related to eye-tracking, speech and facial recognition.



Reading

Research on reading has shown that children acquire decoding and reading comprehension skills at the same time, but that each skill develops independently of the other. Neurodivergent individuals typically perform at average or above-average levels when it comes to decoding written language.

However, they are generally better at sounding out and identifying words than understanding what they have read. This may be because comprehension is a more abstract skill than decoding. It relies on a reader’s sensitivity to story structure, ability to pick up on referents, make inferences and use prior knowledge of the subject to makes sense of the text. For this reason, such individuals experience reading comprehension difficulties, often misinterpreting complex texts, metaphors, and idioms.

Depending on the type of spectrum, it 's better to rely on the signs combinations that are focused on decoding written language, and less - on social comprehension and abstract symbols. During experimentations and scenarios, a combination of visual and text mechanics are actively tested as well.

Memorizing

Working memory is the system that actively holds multiple pieces of transitory information in the mind, where they can be manipulated.

Neurodivergent individuals have both specific difficulties with memory and memory strengths. Memory difficulty is not part of the diagnostic criteria for autism spectrum disorder (ASD); but, it is a common difficulty experienced by many individuals with this diagnosis.

For instance, some studies have shown impairments to their episodic memory but relative preservation of their semantic memory. The brain regions that play a major role in declarative learning and memory are the hippocampus and regions of the medial temporal lobe.

Similar to the learning curve, our goal is to identify memory patterns to effectively build a knowledge ecosystem, communication and interaction with divergent individuals.

Systemizing

Strong systemizing is a way of explaining the non-social features of neurodivergent individuals: narrow interests; repetitive behavior; and resistance to change/need for sameness. This is because when one systemizes, it is best to keep everything constant, and to only vary one thing at a time.

We argue that hyper-systemizing predisposes individuals to show talent, and review evidence that hyper-systemizing is part of the cognitive style of people with autism spectrum conditions (ASC). We then clarify the hyper-systemizing theory, contrasting it to the weak central coherence (WCC) and executive dysfunction (ED) theories. The ED theory has difficulty explaining the existence of talent in ASC. While both hyper-systemizing and WCC theories postulate excellent attention to detail, by itself excellent attention to detail will not produce talent. By contrast, the hyper-systemizing theory argues that excellent attention to detail is directed towards detecting ‘if p, then q’ rules (or [input–operation–output] reasoning).

Depending on the spectrum pattern, systemization-related questions should be addressed in your research.

Empathizing

Empathy is the capacity to understand or feel what another person is experiencing from within their frame of reference, that is, the capacity to place oneself in another's position.

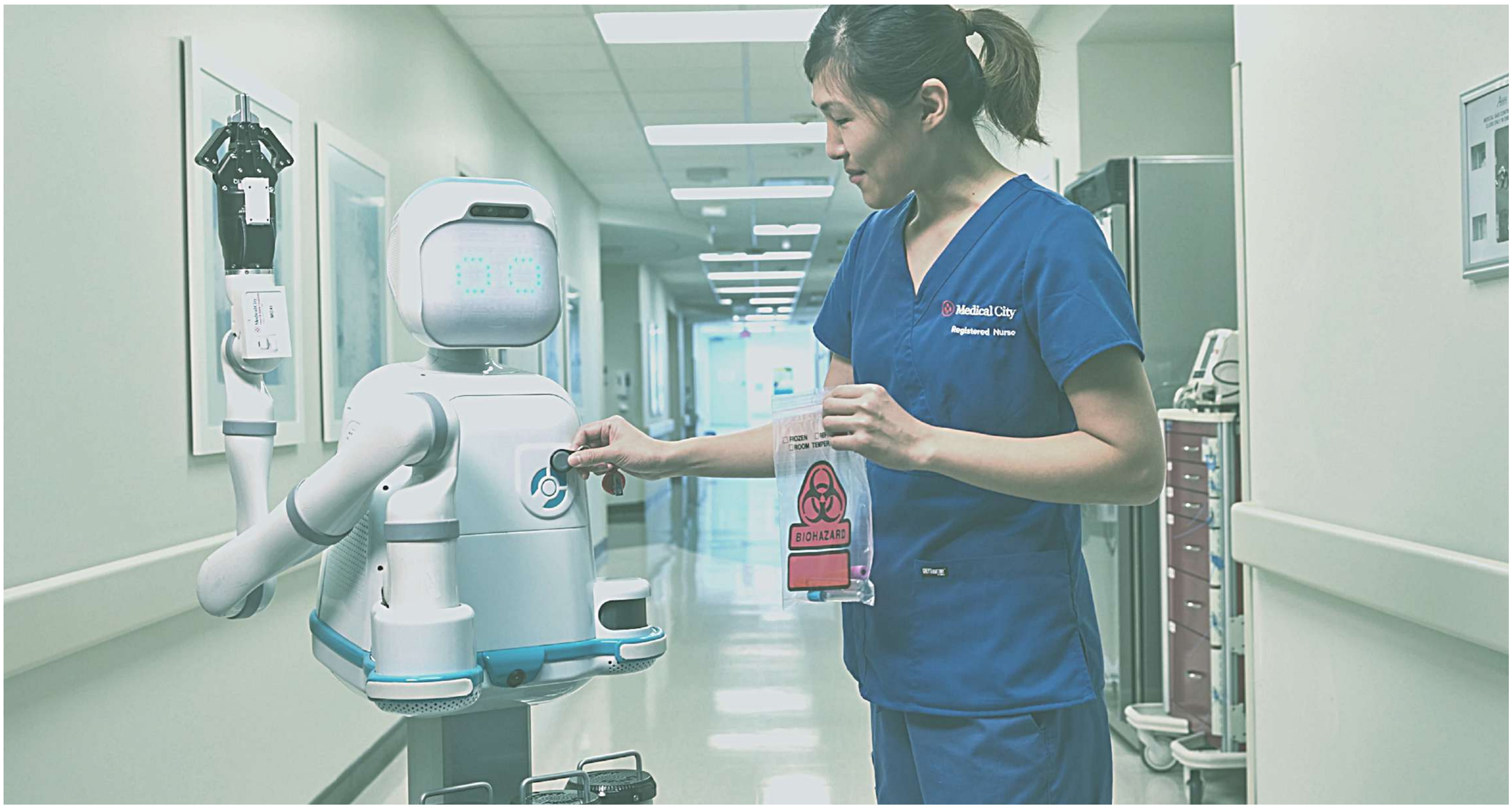
People with autism spectrum disorder are sometimes described as lacking empathy (the ability to feel along with others) and/or sympathy (the ability to feel for others). While this is a persistent stereotype of all people with autism, these challenges are not experienced by everyone on the spectrum. In fact, some experience a type of empathy known as affective empathy, which is based on instincts and involuntary responses to the emotions of others.

AI-driven technologies, solutions and products are widely based on training data extracted from the analysis for the people's behavior, interests and empathy to particular topics, objects or subjects. We actively use it across adaptive learning, emotion recognition, semantic analysis, correlation and like-minded analysis, making "empathy spectrum" an important part of our research approach.

Avoiding isolated silos

According to a global survey, about 33 percent of adults experience feelings of loneliness worldwide. Though, neurodivergent adults face loneliness are even more often. In particular, 79% of neurodivergent individuals feel socially isolated. Moreover, the core characteristics of neurological differences suggest a potential for loneliness, specifically the aspects of intersectionality, unfavorable social, economic and comorbidity aspects are presented.

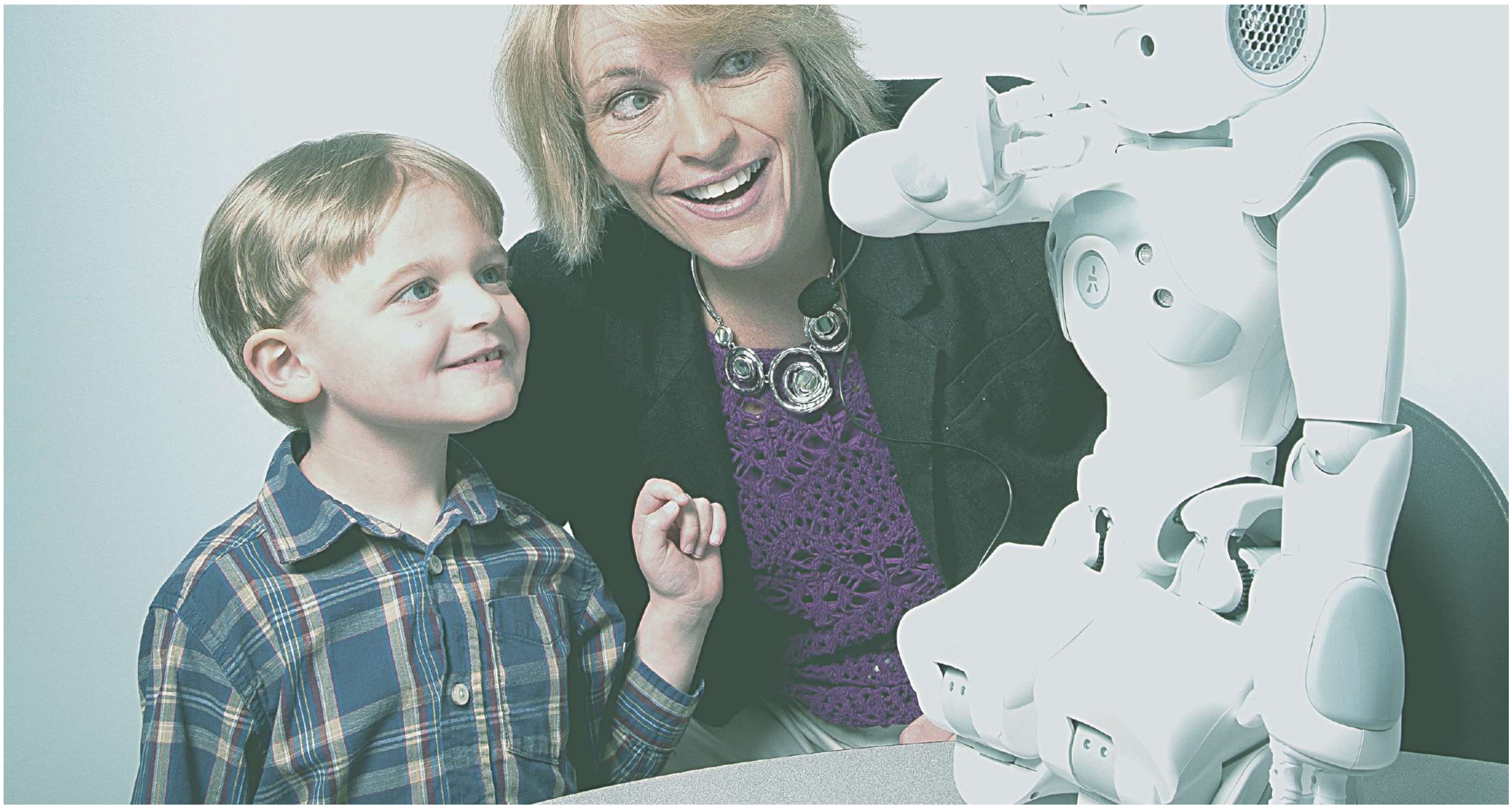
When we build technology we can both avoid or even amplify this isolation, forming "filter bubbles" or "isolated silos". Typically these terms are related to media, content and social networks. Though, with an active adoption of VR/AR in healthcare and education, adaptive learning, the state of "echo chamber" or "filter bubble" is possible in any environment where we provide students, patients, users with personalized interface, content or learning flow. It's specifically important for solutions in areas of assistive learning and cognitive impairment when learner mostly interacts with a social robot or AI device. It means, that our research and design process should clearly state our objective building not "an automatic tool" when child interacts with robot 1 on 1, but a human ecosystem where different stakeholders, social patterns and mechanisms co-exist.



Autonomy & human involvement

Until today, the implementation of "autonomous agents" was mostly related to self-driving cars, security and privacy systems. Though, with a growing trend in computer vision, speech recognition, and social robotics, autonomous technology has become a part of medicine, nursing, classrooms or assistive development environments. It naturally leads to another potential challenge and criteria. When humans employ autonomous systems, they cede some of their own autonomy (decision-making power) to machines.

Though delegating one's autonomy to an intelligent machine is not an ethical problem itself, the question is: If we start trusting algorithms to make decisions, who will have the final word on important decisions - like surgery? Will it be humans, algorithms or both? This topic has a multilayered nature (legal - "objects" and "subjects") of actions and no-actions, and related accountability. From a legal perspective, this discussion is still open. Until then, the "double-check" principle and human involvement is required for any human-related actions, decisions and practices.



Caregivers & "stakeholders"

Until today, we've considered any kind of "diversity" as a negative social trait, thinking about the ecosystem for such divergent, disabled, cognitively and socially different individuals as "assistive", not natural or personalized. Current research approaches propose to turn divergent individuals from "caretakers" to "autonomous" and "independent" users/individuals, consider them equally along with caregivers and stakeholders. It involves family members, counselors, medical professionals, educators and other supporting peers.

It means not only that data input and use of apps and platforms are driven by different groups of individuals, but also necessary to make your interface flexible and accessible for different groups, including options of separate pages, screens, cases.

During the interview you should address:

- Involvement of each individual/group;
- Address specific questions and challenges;
- Reflect it in your research, prototype or solution;
- Take into account possible fluctuations and the necessity to measure data correlation.

Safety and privacy

Such solutions as social robotics for neurodivergent children, AI-trainers for dyslexia and reading improvement, or smart glasses for emotional recognition may target users starting from 5 years old (dyslexia solutions typically target the earliest range around 5 years old, and other solutions typically involve 8,10,12 age ranges). There is also a spectrum of assistive and rehabilitation technologies which are used to support elders with neuromuscular disorders, Parkinson's or Alzheimer's. It also worth mentioning various VR/AR and AI-driven platforms focused on mental health conditions such as depression, anxiety, obsessive-compulsive syndrome and many others.

Though, in general, most of these solutions are safe and don't create potential harm for users, it's important to create and evaluate all possible scenarios, specifically related to children, adolescents, elders and users with cognitive impairment. For instance, social robots focused on autism may too proactively encourage children to communicate, creating too much emotional pressure or interrupting medical / support routine. Thus, our research should encompass, what "safe environment", "curriculum" or interaction looks like for particular groups, individuals or spectrum patterns, including duration, intensity, frequency, approaches to privacy.

Feedback loop, transparency & open diversity data

We often hear that algorithms or technologies "are biased". But in the end, only people, companies and organizations behind them can be actually biased driven by the disconnection between technology and social science, lack of representation, wrong questions, ignorance of a variety of criteria including social, economic, gender, ethnic, underlying conditions and aspects.

Open diversity data projects help organizations and ecosystems publish data related to the representation and wellbeing of your employees or community based on gender, ethnicity, ability, neurodiversity and other criteria. Forming open diversity data culture helps you to build better quality research, improve your approach to training data for ai and robotics solutions, avoid bias and provide a fair approach, bring a transparent view on your research and further development.

Conclusion - Convergence & intersectional research

Until today ecosystems were designed by one vision and after that, we just tried to "include" others to this monopoly of design thinking: women, neurodivergent or disabled people. Even though it doesn't fit them – its nature, logic, mechanism, and definitions…

The universal goal of our work is to demonstrate that our perspectives of the spectrum, differences and divergent lens related to neurodivergent individuals or groups of different abilities, provide a crucial role in our views on the mechanisms of accessible education, classrooms and workplaces, cities and ecosystems not only for primary excluded groups but for secondary excluded, challenges of opportunity and access in general.

It leads us to another critical aspect, driven by the convergence of technology, human rights and bioethics, including shifting from "assistive" to "human-centered", from "accessibility" to "access", from 1-layer research to taking into account a variety of criteria - comorbidity gender, intersectionality, social and economic burden.

It also affects the emerging convergence and intersectionality of technology. Soft robotics can be used both in rehabilitation, neuromuscular disorders and as a supportive solution for a healthy population. Hearing or visual impairment solutions can be used as personalized hearing or augmentation solutions. Smart AI sticks for people with disabilities or Parkinson's can be used both for disabled individuals or geo-location devices[26]. Finally, a variety of solutions, targeting neurodivergent individuals, including social robots, AI trainers, and smart-glasses can be used for neurotypical ones as personalized, augmentation, supportive or extension technologies.

Resources

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8085719/
https://www.scientificamerican.com/article/autism-it-s-different-in-girls
https://www.pragmatichealthethics.ca/wp-content/uploads/2020/05/2020_Cascio_et_al-2020-Review_Journal_of_Autism_and_Developmental_Disorders.pdf
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https://www.spectrumnews.org/news/sensory-sensitivity-may-share-genetic-roots-autism
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COMMENTARIES TO EXPLORATION, RESEARCH AND DESIGN THROUGH THE LENS OF (NEURO)DIVERSITY & ACCESSIBILITY