



Web4All

THE WEB CONFERENCE



The 16th International
Web for All Conference

San Francisco, 2019

<http://www.w4a.info/2019/>

#w4a2019

Endorsed by the IW3C2

International World Wide Web Conference Committee

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Foreword

The International Web for All Conference (W4A) began in 2004 as a workshop to make the World Wide Web accessible for people with disabilities. Over the years the workshop has grown into the top conference for web accessibility research, attracting a diverse crowd from academia, industry, government, and nonprofits. W4A has become the venue for scientists, students, and practitioners from around the world to showcase their latest research, widen their perspectives through discussions with peers, and establish future research agendas.

W4A is an influential conference that has a growing impact on the research community. According to the ACM Digital Library Bibliometric, people downloaded each of the W4A's 431 papers an average of 353 times and W4A papers were citation average of 4.64. These data confirm that W4A does not only provide excellent visibility to papers but also enables strong scientific impact.

We have always embraced the potential of new technologies to provide an accessible user experience for everyone. No longer do we look at technology and its potential challenges for users, but we look for how it can be used to provide accessible experiences for all. In recognition of the emergence of this new age, the theme for the 16th International Web for All Conference is “Personalization – Personalizing the Web.” Personalization pervades all aspects of technology from home appliances to mobile phones, from shopping experiences to education. AI affords the potential for improved personalization to an individual’s contextualized abilities. The Web of Things means we now have the web on all kinds of devices (including wearables) that require better and seamless personalization for all.

This year, we received 49 submissions from 12 countries showing steady interest of the research community. The submissions covered a wide range of topics including design methodologies, evaluation and testing, personalisation, mobile and wearable devices, policies, and others. Thirteen technical papers and 5 communication papers were selected through a rigorous peer review process.

This year, W4A will feature two keynote speakers. Jutta Treviranus, Director of the Inclusive Design Research Centre (IDRC) and Professor in the Faculty of Design at OCAD University, Toronto, and Simon Harper, Professor and Head of the Interaction Analysis and Modelling Laboratory in the School of Computer Science, University of Manchester and founder of the W4A conference. The “William Loughborough” Conference After Dinner Talk will be given by Alan Brightman, Former Vice President at Yahoo & Founder of Apple Computer’s Worldwide Disability Solutions Group.

Many people have contributed to the success of this conference. We would like to thank the Program Committee for their exceptional work and dedication in the

review process. We would also like to thank the authors for their excellent work and thank delegates for their participation. Finally, we would like to thank our sponsors and supporters: Google, Hewlett-Packard, IBM, Intuit, Microsoft, Tenon, Verizon, OpenConf, WebKeyIT, Capti, PEAT, Ability Magazine, DIAGRAM Center, ACM Digital Library, ACM SIGACCESS, ACM SIGCHI, ACM SIGWEB, and The Web Conference.

Amy Hurst and Carlos Duarte, May 2019.

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Conference Program

Monday, May 13, 2019

- **9:00 - 9:15 a.m. - Conference opening**
- **09:15 - 10:30 a.m. - Keynote; Session Chair: Volker Sorge**
 - Jutta Treviranus, OCAD University Toronto
- **10:30 - 11 a.m. - Morning break**
- **11 a.m. - 12:35 p.m. - Session 1: Policies and Personalization; Session Chair: Amy Hurst**
 - (11 a.m.) Continuous Web Personalization using Selector-template Pairs; Vagner Figueredo de Santana, M. Cecilia C. Baranauskas
 - (11:20 a.m.) Personalization in the Interactive EPUB 3 Reading Experience: Accessibility Issues for Screen Reader Users; Barbara Leporini, Clara Meattini
 - (11:40 a.m.) Automatic Identification of Widgets and their Subcomponents Based on a Classification Pipeline for DOM Mutation Records; Eduardo Henrique Rizo, Renata Pontin de Mattos Fortes, Humberto Lidio Antonelli, Willian Massami Watanabe
 - (12 p.m.) The effect of typeface and font size on reading text on a tablet computer for older and younger people; Maneerut Chatrangsan, Helen Petrie
 - (12:20 p.m.) Combining Semantic Tools for Automatic Evaluation of Alternative Texts; Carlos Duarte, Carlos M. Duarte, Luís Carriço
- **12:35 - 1:45 p.m. - Lunch**
- **1:45 - 2:15 p.m. - Session 2: IBM Award for Students with Disabilities; Session Chair: Chieko Asakawa**
- **2:15 - 3:15 p.m. - Session 3: Tenon Web Accessibility Challenge presentation session; Session Chair: Yu Zhong**
- **3:15 - 4 p.m. Break**
- **4 - 4:55 p.m. - Session 4: Tenon Web Accessibility Challenge demonstration session; Session Chair: Yu Zhong**

- **5 - 5:35 p.m. - Session 5: Teaching and Designing for the Web; Session Chair: Jutta Treviranus**
 - (5 p.m.) Adaptable Accessibility Features for Mathematics on the Web; Davide Cervone, Volker Sorge
 - (5:15 p.m.) Blind Web Development Training at Oysters and Pearls, Uganda; Claire Kearney-Volpe, Amy Hurst, Scott Fitzgerald
- **7 p.m. - W4A Conference Dinner**
 - The William Loughborough After Dinner Web Geezer Speech: Alan Brightman

Tuesday, May 14, 2019

- **9:15 - 10:30 a.m. - Keynote; Session Chair: Elaine Pearson**
 - Simon Harper, University of Manchester
- **10:30 - 11 a.m. - Break**
- **11 a.m. - 12:30 p.m. - Session 6: Multimodal Interactions; Session Chair: Ted Drake**
 - (11 a.m.) It's All About the Message! Visual Experience is a Precursor to Accurate Auditory Interaction; Simon Harper, Sukru Eraslan, Yeliz Yesilada
 - (11:20 a.m.) AudioFunctions.web: Multimodal Exploration of Mathematical Function Graphs; Dragan Ahmetovic, Cristian Bernareggi, João Guerreiro, Sergio Mascetti, Anna Capietto
 - (11:40 a.m.) Addressing the Situational Impairments Encountered by Firefighters through the Design of Alerts; Flynn Wolf, Priyanka Soni, Ravi Kuber, Dianne Pawluk, Brian Turnage
 - (12 p.m.) Exploring feasibility of wrist gestures for non-visual interaction with wearables; Shirin Feiz, IV Ramakrishnan (Best Communication Paper Nominee)
 - (12:15 p.m.) Personalised and Accessible TV Interaction for People with Visual Impairments; Daniel Costa, Carlos Duarte
- **12:30 - 1:30 p.m. - Lunch**
- **1:30 - 2:15 p.m. - Session 7: Google Doctoral Consortium presentation session; Session Chair: Hironobu Takagi**
- **2:15 - 2:30 p.m. - Session 8: Ability Magazine Job Fair; Session Chair: Volker Sorge**
- **2:30 - 3:30 p.m. - Session 9: Navigation; Session Chair: Carlos Duarte**
 - (2:30 p.m.) SafeExit4All: An Inclusive Indoor Emergency Evacuation System for People With Disabilities; Seyed Ali Cheraghi, Anup Sharma, Vinod Namboodiri, Güler Arsal (Best Technical Paper Nominee)
 - (2:50 p.m.) An Independent and Interactive Museum Experience for

Blind People; Saki Asakawa, João Guerreiro, Daisuke Sato, Hironobu Takagi, Dragan Ahmetovic, Desi Gonzalez, Kris M. Kitani, Chieko Asakawa

- (3:10 p.m.) Impact of Expertise on Interaction Preferences for Navigation Assistance of Visually Impaired Individuals; Dragan Ahmetovic, João Guerreiro, Eshed Ohn-Bar, Kris M. Kitani, Chieko Asakawa (Best Technical Paper Nominee)

● **2:30 - 4 p.m. Break**

● **4 - 4:55 p.m. - Session 10: Designing for Neurodiversity; Session Chair: Simon Harper**

- (4 p.m.) A Computer Anxiety Model for Elderly Users Interacting with the Web; Thiago Donizetti dos Santos, Vagner Figueredo de Santana
- (4:20 p.m.) Designing Personalized Therapy Tools For People with Dementia; Sérgio Alves, Filipa Brito, Andreia Cordeiro, Luís Carriço, Tiago Guerreiro (Best Technical Paper Nominee)
- (4:40 p.m.) Adults with High-functioning Autism Process Web Pages With Similar Accuracy but Higher Cognitive Effort Compared to Controls; Victoria Yaneva, Le An Ha, Sukru Eraslan, Yeliz Yesilada (Best Communication Paper Nominee)

● **5 - 5:30 p.m. Awards and closing**

Wednesday, May 15, 2019

● **9 a.m. - 6 p.m. W4A/DIAGRAM Centre Hackathon**

LightHouse for the Blind and Visually Impaired, 1155 Market Street, San Francisco

Thursday, May 16, 2019

● **9 a.m. - 5 p.m. W4A/DIAGRAM Centre Hackathon**

LightHouse for the Blind and Visually Impaired, 1155 Market Street, San Francisco

Conference Information

Publications

Conference proceedings have the ISBN is [978-1-4503-6716-5](#) and include abstracts and notes sections for all our technical, communications, challenge, doctoral consortium and keynote presentations. The conference proceedings will be published as part of the ACM International Conference Proceedings Series and will be available at the ACM Digital Library.

History

W4A was established in 2004 as a cross-disciplinary conference focusing on research in the area of the Web and accessibility, primarily for people with disabilities. Since then, it has become an established part of the accessibility research calendar, taking place alongside the annual WWW conference. Every year, we welcome between 50-70 attendees, who come from a large number of research institutions around the world, including academia, industry, government, and disability support organizations.

Papers have typically been reviewed by at least three of our program committee members with an average acceptance rate of 35%. Papers of our conference are published in ISBNed ACM proceedings and in various Special Issues of respected journals within the field. We also solicit sponsorship from the ACM SIGACCESS, ACM SIGCHI, ACM SIGWEB, plus organisations including IBM Research, Adobe, Mozilla Foundation, Google, Microsoft, Tenon, Zakon Group.

Lunch and Coffee

The conference lunch and coffee will be held together with the World Wide Web conference. The morning coffee break is scheduled for 10:30-11:00, the lunch for 12:30-13.30 and the afternoon coffee break is scheduled for 15:30-16:00.

Past Conference Locations:

W4A 2018, Lyon, France

W4A 2017, Perth, Australia

W4A 2015, Florence, Italy

W4A 2013, Rio de Janeiro, Brazil

W4A 2011, Hyderabad, India

W4A 2009, Madrid, Spain

W4A 2007, Banff, Canada

W4A 2005, Chiba, Japan

W4A 2016, Montreal, Canada

W4A 2014, Seoul, South Korea

W4A 2012, Lyon, France

W4A 2010, Raleigh, NC, USA

W4A 2008, Beijing, China

W4A 2006, Edinburgh, UK

W4A 2004, New York, NY, USA

Keynote Speakers

Jutta Treviranus

Director of the [Inclusive Design Research Centre \(IDRC\)](#) & Professor in the Faculty of Design at OCAD University, Toronto

Jutta established the IDRC in 1993 as the nexus of a growing global community that proactively works to ensure that our digitally transformed and globally connected society is designed inclusively. Jutta and her team have pioneered network-supported personalization as an approach to accessibility in the digital domain. She also heads the [Inclusive Design Institute](#), a multi-university regional centre of expertise. Jutta founded an innovative graduate program in inclusive design at OCAD University. She is the co-director of Raising the Floor International. She leads international multi-partner research networks that have created broadly implemented innovations that support inclusion e.g., [Fluid Project](#), [FLOE](#), and many others. She has played a leading role in developing accessibility legislation, standards and specifications internationally (including W3C WAI ATAG, IMS AccessForAll, ISO 24751, and AODA Information and Communication). Jutta's leadership in Inclusive Design has been recognized through awards, such as a Diamond Jubilee Medal and recognition as one of Canada's top 45 over 45 by Zoomer Magazine. Jutta's work has been attributed as the impetus for corporate adoption of more inclusive practices in large enterprise companies such as Microsoft.



Simon Harper

Professor in Computer Science at the University of Manchester, UK and Head of the Interaction Analysis and Modelling Laboratory

Simon Harper is a Professor in Computer Science, a Fellow of the BCS, a Fellow of the IET, and an ACM Distinguished Scientist, and leads the Interaction Analysis and Modelling Laboratory. His previous work has resulted in a number of works of significant impact; indeed, ACM Past President Alexander Wolf described his work as having 'singular impacts on the vital field of computing' and his 'achievements have had



a significant influence on the social, economic and cultural areas of daily lives all over the world'. He is Past-Chair of the W3C WAI Research and Development Working Group, Past-member of the User Agent Working group, and Past-Member of the Web Accessibility Initiative Coordination Group. A recipient of the ACM Doug Engelbart prize, the ADDW IBM Research prize, the W4A Microsoft Judges Award.

W4A/Tenon Web Accessibility Challenge

The W4A/Tenon Web Accessibility Challenge has been generously sponsored by Tenon and is offered as a medium for researchers, web developers, and software engineers to showcase new and innovative technologies in the area of web accessibility.

The W4A/Tenon Web Accessibility Challenge consists of two prizes: the Judges Award and the Delegates Award. The Judges Award is awarded by a panel of recognised experts from a wide range of sectors covering industry bodies and academic institutions. This year, we are honoured to have the participation of Shaomei Wu from Facebook, Greg Gay from Ryerson University, and David Swallow from The Paciello Group. We'd like to take this opportunity to thank the distinguished judges for their contribution to the conference.

The Delegates Award is awarded by the delegates of the W4A Conference by secret ballot after listening to the Challenge presentations and experiencing the solutions during a demonstration session. The Challenge session is an interesting and exciting part of the W4A Conference, since authors can make their own case for the impact of their Accessible Technology and the award results may be different from the Judges' decision.

This year we received a total of 11 high-quality entries from across the globe, including representatives from Argentina, Brazil, Canada, India, Italy, the United Kingdom, and the United States. The contributions focus on different areas of web accessibility, and, when examined as a whole, the solutions provide a collection of innovations that support the needs of a diverse range of users, fitting the ethos of the W4A Conference perfectly.

All authors will receive valuable feedback from the conference attendees and have the possibility of networking with individuals from industry, academia, and regulatory and standards bodies regarding their technologies.

Yu Zhong and Sarah Horton, May 2019

W4A Google Doctoral Consortium

The 2019 W4A Conference also features the fourth edition of the W4A Google Doctoral Consortium. As in previous years, we are generously supported by Google sponsoring the event, allowing us to give Doctoral Consortium Awards to talented students. The awards provide financial support for four students to attend the W4A Conference, present their research and gain valuable feedback from top researchers and practitioners in the field of web accessibility.

This year we received five submissions, leading to a selection process for the four successful candidates. All submissions were thoroughly reviewed by the panel of expert judges and evaluated with respect to previously announced review criteria in terms of their relevance to W4A, overall awareness of their field, originality of the work and its potential impact.

The W4A Organizing Committee would therefore like to thank the judges for their dedicated effort and is happy to introduce the 2019 participants in the Doctoral Consortium:

- Akashdeep Bansal, Indian Institute of Technology Delhi, India
- Shantanu Ladkat, Sinhgad Institute of Management and Computer Application, affiliated to Savitribai Phule Pune University, Pune
- Makuochi Samuel Nkwo, Ebonyi State University, Abakaliki, Nigeria
- Claire Kearney-Volpe, New York University, New York, USA

The Doctoral Consortium session will be held the day before the main conference. Students present their research to the Doctoral Consortium Panel comprised of Helen Petrie (University of York), Hironobu Takagi (IBM) and Yu Zhong (Google). In addition, all students will give short presentations of their work during the main conference and their extended abstracts are included in these proceedings.

Once again, we are most thankful to Google Inc. for their generous support, and we look forward to their ongoing involvement in W4A.

Hironobu Takagi and Helen Petrie
May 2019

W4A/DIAGRAM Hackathon

As in previous years, we will again have a Web4All hackathon to round out the conference. This year the hackathon will run for two days from May 15-16, 2019. It will be organized jointly with [PEAT the Partnership on Employment and Accessible Technology](#) and the [DIAGRAM Center](#) — a Benetech Global Literacy initiative — on production and provision of accessible educational materials. We are excited to hold the hackathon at the [Lighthouse for the Blind and Visually Impaired](#) in San Francisco and we are very grateful to the Microsoft Corporation for fully sponsoring the event.

The 2019 W4A Hackathon is the third in the series of successful events that include

- [2017 Hackathon in Perth hosted by Bankwest](#)
- [2016 Hackathon in Montreal hosted by Google](#)

The goal is again to spend time and expertise on furthering the accessibility of a commonly used web tool. This year, one major theme will be to work on the accessibility issues in [Jupyter Lab](#). Additionally, delegates are welcome to pitch their own accessibility projects at the start of the event.

Attendees registered for W4A are eligible to participate as part of their conference experience at no extra cost. However, conference attendance is not a prerequisite and we are particularly excited to welcome members and friends of the DIAGRAM Center and developers of Jupyter Lab as participants.

2019 W4A Hackathon

Wednesday May 15 and Thursday May 16, 9 a.m. - 6 p.m., LightHouse for the Blind and Visually Impaired, 1155 Market Street, San Francisco, CA 94103.

Attendance is free and catering will be provided, but spaces are limited, so please sign up as soon as possible. [Sign up](#).

IBM People with Disabilities Award

This is the fourth year that W4A is able to grant qualifying students the IBM People with Disabilities Award. This year, we received some strong applicants, but only two winners will receive the award and be reimbursed for all attendance costs. The awardees will be introduced to the community of W4A researchers and practitioners who are working to make web, mobile, and wearable devices accessible for all. We thank IBM for their generous sponsorship and hope to see more submissions in 2019.

The W4A Organizing Committee is happy to introduce the 2019 winners

- Akashdeep Bansal, Indian Institute of Technology Delhi, India
- Pawan Kumar Patel, Indian Institute of Technology Kanpur, India

Chieko Asakawa and Yevgen Borodin, May
2019

Intuit Best Paper Awards

The W4A Organizing Committee is proud to announce the 2019 awards for Best Technical Paper and Best Communication Paper are sponsored by Intuit. We are grateful for their continued support.

Best Technical Paper Nominees

- Designing Personalized Therapy Tools For People with Dementia - Sérgio Alves, Filipa Brita, Andreia Cordeiro, Luís Carriço, Tiago Guerreiro
- Impact of Expertise on Interaction Preferences for Navigation Assistance of Visually Impaired Individuals - Dragan Ahmetovic, João Guerreiro, Eshed Ohn-Bar, Kris M. Litani, Chieko Asakawa
- SafeExit4All: An Inclusive Indoor Emergency Evacuation System for People With Disabilities - Seyed Ali Cheraghi, Anup Sharma, Vinod Namboodiri, Güler Aarsal

Best Communication Paper Nominees

- Adults with High-functioning Autism Process Web Pages With Similar Accuracy but Higher Cognitive Effort Compared to Controls - Victoria Yaneva, Le An Ha, Sukru Eraslan, Yeliz Yesilada
- Exploring feasibility of wrist gestures for non-visual interaction with wearables - Shirin Feiz, IV Ramakrishnan

Program

Keynote

The Value of Being Different

Jutta Treviranus, OCAD University, Toronto

A single common characteristic of disability is difference - sufficient difference from the hypothetical average that many things are not made to fit your needs. How do we move from a common accessibility checklist to a system that recognizes our individual differences, our entangled complex lives, and inevitable change? What are the risks and what are the possibilities? How will this benefit the Web?

Notes:

Session 1: Policies and Personalization

Continuous Web Personalization using Selector-template Pairs

Vagner Figueredo de Santana, IBM Research; M. Cecilia C. Baranauskas, University of Campinas

Due to the fast growth of the Web and to the interactivity brought by Web 2.0, government, entertainment, and education services are more and more available through the Internet. However, this highly interactive Web still excludes people by not considering capabilities of all users. Although there are techniques and

approaches towards Web Accessibility, issues related to different user needs may emerge in unforeseen contexts of use. This paper proposes a personalization approach that considers detailed observational data from usage and generates user interface adjustments (pieces of JavaScript code) from a set of selector-template pairs. Selectors are regular expressions used to identify patterns in event streams and templates are adjustments skeletons, referring user interface elements identified by the selectors. The approach supports continuous personalization of websites aiming to reduce the number of accessibility barriers and usability problems. This work is part of a long-term project and it reports the study conducted “in the wild” with 408 users, during a period of 30 months. The results point that the approach is a scalable solution towards web personalization by inserting JavaScript pieces of code to tailor websites according to how they are used on the fly.

Notes:

Personalization in the Interactive EPUB 3 Reading Experience: Accessibility Issues for Screen Reader Users

Barbara Leporini, ISTI-CNR; Clara Meattini, ISTI-CNR

In this paper, we describe the study conducted to investigate accessibility using EPUB 3 with particular focus on interaction via screen reader. A multimedia and interactive EPUB 3 prototype was designed for the purpose. In particular, personalization features based on user preferences were designed to customize the reading experience and enrich the interactive experience. Despite the fact that the EPUB format is based on HTML5, and numerous guidelines for web-based technology can be applied to overcome accessibility barriers, several issues still exist with the current standard EPUB 3 when accessing via screen reader. This study contributes to digital publishing for assistive technology and reading application development by promoting accessibility in EPUB interaction. Thus, some considerations and suggestions in that direction end the paper.

Notes:

Automatic Identification of Widgets and their Subcomponents Based on a Classification Pipeline for DOM Mutation Records

Eduardo Henrique Rizo, UTFPR - Federal Technology University of Paraná; Renata Pontin de Mattos Fortes, University of São Paulo; Humberto Lidio Antonelli, University of São Paulo; Willian Massami Watanabe - UTFPR - Federal Technology University of Paraná

Since Web 2.0, web developers have increased the use of more sophisticated interaction mechanisms and visual effects, called widgets, to design the Rich Internet Applications' (RIA) user interface. However, many of the widgets currently available on websites do not implement accessibility design solutions standardized in the Accessible Rich Internet Applications (ARIA) specification and hence they are not accessible to disabled people. This paper come up with an approach for automatically classifying dropdown menu widgets and their subcomponents using a machine learning pipeline which analyses mutations that occur in RIAs' Document Object Model (DOM) structure, triggered by users interactions or visual effects. Classifying widgets and their subcomponents is an essential step for automatic evaluation of ARIA conformance and HTML code adaptation to mitigate accessibility issues. Thus, we also aim to take steps toward easing the software engineering process of RIAs in conformance with ARIA specifications. To validate, was conducted a case study with real websites to evaluate the proposed machine learning pipeline. The results provide evidence that our approach is capable of classifying dropdown menu widgets and their subcomponents with 0.91 F-measure in average.

Notes:

The effect of typeface and font size on reading text on a tablet computer for older and younger people

Maneerut Chatrangsan, University of York; Helen Petrie, University of York

This study investigated the effect of typeface and font size on reading on tablet computers with younger and older participants in Thailand and the UK, in Thai and English, respectively. The effects of two typeface (serif and sans serif) and three font sizes (14, 16 and 18 point) were investigated. Participants skimmed six texts and answered questions about each text. In both countries, reading time was significantly affected by font size but not by typeface and there were no differences between the age groups. Eighteen point was significantly faster to read than 14 or 16 point. Comprehension was significantly better with larger and serif fonts in both

countries. Participants in the UK rated the sans serif typeface easier and less tiring to read while Thai participants rated the serif font easier and less tiring to read. On overall preference, more than 50 percent of the UK participants chose 18 point sans serif, whereas more than 50 percent of Thai participants chose 18 point serif.

Notes:

Combining Semantic Tools for Automatic Evaluation of Alternative Texts

Carlos Duarte, Universidade de Lisboa; Carlos M. Duarte, Universidade de Lisboa; Luís Carriço, Universidade de Lisboa

Automated accessibility evaluation will have an increasingly important role in the near future due to legal requirements to monitor the accessibility of the websites of public bodies in the European Union. However, automated evaluation tools are still limited in the scope of the conformance testing they are able to perform. Future solutions resorting to AI based techniques might help in addressing some of these limitations. In this paper we present an updated version of an algorithm that classifies the quality, from an accessibility perspective, of alternative texts for images in web pages. We evaluated the proposed algorithm on a set of 149 images and their corresponding alternative texts and found improved performance compared to the initial version of the algorithm.

Notes:

Session 2: IBM Award for Students with Disabilities

W4A is happy to announce the IBM People with Disabilities Student Award. The award reimburses the attendance costs for several students with disabilities and introduces them to the community of W4A researchers and practitioners who are working to make Web, Mobile, and Wearable devices accessible for all.

This year's awards go to:

- Akashdeep Bansal, Indian Institute of Technology Delhi, India
- Pawan Kumar Patel, Indian Institute of Technology Kanpur, India

Session 3: Tenon Web Accessibility Challenge – Presentation Session

This year the W4A/Tenon Web Accessibility Challenge will involve two activities:

- A five- to 10-minute pitch presentation (Session 4)
- A five- to 10-minute lightning demo

Presentation Session:

During a five- to-10-minute presentation, each Challenge entrant will “pitch” their solution to delegates and articulate the innovative aspects of their technology and how it advances accessibility and usability. Their presentation will define the accessibility issue their technology solves, and describe the innovations one can expect to see during the demonstration session that will follow.

There will be scheduled break following the presentation session.

Session 4: Tenon Web Accessibility Challenge – Demonstration Session

Demonstration Session

To ensure the session can commence on schedule, please return from the break on time. Delegates will then be given a voting ballot paper, split into groups and assigned a station where they will start the demonstration session. When the bell rings, the presenter at the station will do his or her five- to-10-minute demo of the innovative aspect of their technology. The presenter may or may not allocate time for questions during the session.

After five minutes the bell will ring again, at which time your group will move on to the next demo. This continues until all groups have visited all the demos. “Timekeepers” will be present who will facilitate the rotation between demo stations.

Presenters

An Easy to Use Data Logger for Local User Studies

Vagner Figueredo de Santana, Felipe Eduardo Ferreira Silva, IBM Research, Brazil

Multimodal Exploration of Mathematical Function Graphs with AudioFunctions.web

Dragan Ahmetovic, Anna Capietto, Università degli Studi di Torino; Cristian Bernareggi, Sergio Mascetti, Università degli Studi di Milano; João Guerreiro, Carnegie Mellon University

Building Conversational Interfaces to Make the Web Accessible for All

Sahil Gera, Myplanet

Evaluation of a Prototype Interactive Working Memory Application for Children with Learning Disabilities

Elaine Pearson, Adel Shaban, Teesside University

Feel-It: Personalized Audio-Tactile Web Browsing

Anatoliy Borodin, Yevgen Borodin, Andrii Soviak, Vikas Ashok, Shirin Disfani, I.V. Ramakrishnan, Stony Brook University

GuideCall: Affordable and Trustworthy Video Call-Based Remote

Naveen M. Ravindran, Seyed Ali Cheraghi, Vinod Namboodiri, Wichita State University; Rakesh Babu, Envision Research Institute

Handsfree for Web: A Google Chrome extension to browse the web via voice commands

Javier Pérez, National University of La Plata

Making Legacy Digital Content Accessible at Source

Sankalan Pal Chowdhary, M. Balakrishnan, Akashdeep Bansal, Himanshu Garg, IIT Delhi; Dipendra Manocha, Saksham Trust

Pushpak: Voice Command-based eBook Navigator

Shradha Holani, Akashdeep Bansal, M. Balakrishnan, IIT Delhi

Synesthesia Vision integration with Recife's Public Transport

Aida A. Ferreira, Gilmar Brito, Lidya Nascimento da Silva, João Victor Mouzinho, Ryan Morais, Jonathan Romualdo Pereira, IFPE

Write-it-Yourself: Empowering Blind People to Independently Fill-out Paper Forms

Syed Masum Billah, Shirin Feiz, Vikas Ashok, Roy Shilkrot, IV Ramakrishnan, Stony Brook University

Session 5: Teaching and Designing for the Web

Adaptable Accessibility Features for Mathematics on the Web

Davide Cervone, MathJax Consortium; Volker Sorge, MathJax Consortium

Accessibility of mathematics is still a challenging problem and providing the right level of support to a reader depends on many factors, such as their particular assistive technology needs, level of expertise, and subject area they are working in. We present work toward making math accessibility more adaptable to the reader's personal needs that is implemented in the MathJax library for rendering mathematics on the web. While MathJax provided accessibility support for several years, the new version 3 has both more new features and means of personalization. In particular, it provides adaptable combinations of highlighting, colorization, and magnification techniques. Both braille and speech output can be generated, with different speech rule sets allowing readers to flexibly change presentation and adaptation for better

interpretation of formulas in different subject areas such as physics, chemistry, and logic.

Notes:

Blind Web Development Training at Oysters and Pearls, Uganda

Claire Kearney-Volpe, New York University; Amy Hurst, New York University; Scott Fitzgerald, New York University

Despite a growing emphasis and vocational demand for STEM education and code literacy, many coding resources and curricula are not easily accessible to individuals with vision impairments. Given the international demand for code literacy and web development skills, we must strive to create accessible educational materials that are effective across multiple cultures. In this paper we describe formative work in the development and evaluation of a seven-day course in web development that we taught at the Oysters and Pearls Technology Camp in Gulu, Uganda to 13 blind and low-vision students who had no experience building websites. We describe our curriculum design, development of custom tactile and software educational tools, and student experiences taking the course. Students in the course learned new web development skills and self-reported a strong sense of pride and enthusiasm to continue their studies upon completion of the course. We make suggestions for future iterations of this curriculum and generalizable advice to others interested in developing accessible programming courses.

Notes:

Conference Dinner

You won't want to miss this year's conference dinner in the historic [Fisherman's Wharf](#) area of San Francisco. This area was created with the rubble from the 1906 San Francisco Earthquake, which leveled the city. It quickly became the heart of the area's fishing fleet with streetside cafes featuring fresh crab and fish. You'll have a fantastic view of the bay, the Golden Gate Bridge, a museum of coin operated games, the Ghirardelli chocolate factory, Boudin's sourdough bread, cable cars, and The Buena Vista, home of the Irish Coffee. So it is worthwhile arriving early to enjoy the view and stay late for the ambiance.

The conference dinner will be held at [The Grotto](#), 2847 Taylor Street, San Francisco. The main dining room is on the first floor and is fully wheelchair accessible. It offers an unrivaled view of the harbor and the Golden Gate Bridge.

The restaurant is roughly 1.5 miles from the conference hotel. It is easily reachable by taking a vintage cable car (Muni Lines E or F) from outside the Ferry Building or via a stroll along the piers (allow around 40 minutes for walking). The Muni is wheelchair accessible. You can also grab one of the electric scooters scattered on the sidewalks.

The "William Loughborough" After-Dinner Talk

About the William Loughborough Speech. This has been an annual and eagerly anticipated part of W4A since 2010, when it was introduced in memory of William Loughborough, a longtime advocate for accessibility and inclusive design. William was a talented technologist and engineer, and an enthusiastic supporter of W4A, regularly providing thoughtful feedback to presenters in his inimitable way. We invited William to speak at the W4A 2010 conference dinner in Raleigh, North Carolina; but sadly he died shortly before the event. So in William's honor, every year we invite a well-regarded speaker from the accessibility community to address the conference delegates with a speech that is likely to be provocative, challenges conventions, and insightful and humorous— always one that will give us food for thought.

Find out more about William's life and work at: <http://media-dis-n-dat.blogspot.co.uk/2010/05/obituary-william-loughborough-pioneer.html>

This year's speech will be given by 3tman, USA:

Alan Brightman

Former Vice President at Yahoo & Founder of Apple Computer's Worldwide Disability Solutions Group

Alan Brightman received a Ph.D. in Education from Harvard University and an Honorary Ph.D. in Science from The University of Massachusetts. His professional accomplishments in areas related to individuals with disabilities as well as older adults reflect a career devoted both to increasing the quality of life for underserved and often-overlooked members of society, and to developing large-scale business opportunities to serve the needs of these segments.

Brightman was most recently a vice president at Yahoo where he created the Accessibility Group in 2006. This group continues to be responsible for ensuring that all of Yahoo's internet products are as accessible as possible to individuals with disabilities.

Previously, Brightman was the Founder of Apple Computer's Worldwide Disability Solutions Group and served as its Director for thirteen years. In this capacity he worked closely with Apple Inc.'s hardware and software engineering teams as well as with diverse teams in marketing, sales, industrial design, and public relations to ensure that all Apple products, programs, and services were accessible to children and adults with disabilities.

While at Apple, he coauthored "Independence Day: Designing Computer Solutions for Individuals With Disabilities" and produced a variety of videos designed to illustrate the role of technology and telecommunications in increasing options and opportunities for all children and adults.

Throughout his career, one of Brightman's principal aims has been to use mass media and mainstream technologies to substantially enhance the quality of life for stereotyped—often ignored—children and adults. Toward this end, he has published a number of books—for children as well as adults—aimed at fostering full participation of disabled individuals in all aspects of society. One of his books, "Steps



To Independence,” is now in its fourth edition and has been translated into eight languages. He also produced an award-winning television series called “Feeling Free,” for PBS as well as a one-person photographic exhibition designed to increase understanding and acceptance of disabled individuals. This exhibition, entitled “Ordinary Moments The Disabled Experience,” toured the U.S. for three years.. Brightman currently serves on the board of directors of the Cerebral Palsy Foundation and was a member of the board of directors of the Starbright Foundation, an international organization chaired by Steven Spielberg that works to create new futures for seriously ill children. He was also executive producer for Starbright of a series of programs entitled “Videos With Attitude,” aimed at illuminating the true, tough, and occasionally humorous experiences of sickness and disability.

In recognition of his work in the field of assistive technology, Brightman was awarded a lifetime achievement award from Boston University. His most recent book “DisabilityLand” was the recipient of a Benjamin Franklin Award.

Keynote

Better Accessibility Research for the Future

Simon Harper, University of Manchester

Welcome to my insecurities and the lonely questions I ask myself at 03:00 in the morning. I'll present five “Notes to My Past Self” which outline the things I should have considered—and am now considering—that would have made my accessibility work better. I'll take a look at impact and public dissemination, and reproducibility. I'll ask “What is the Web?” and “What is Accessibility.” Finally, I'll look at an example case focused on Type 1 Diabetes and the “#WeAreNotWaiting” movement. The talk will be more of a chat in which I hope you'll participate.

Notes:

Session 6: Multimodal Interactions

It's All About the Message! Visual Experience is a Precursor to Accurate Auditory Interaction

Simon Harper, University of Manchester; Sukru Eraslan, Middle East Technical University; Yeliz Yesilada, Middle East Technical University

Anecdotal evidence suggests there is a disjoint between the interaction experiences of sighted and visually disabled web users. However, we propose the converse and suggest that this disjoint is created by the lack of understanding of the interplay between the two domains. Current research shows that there is one single locus of attention at a given time in the context of web interaction, and therefore sighted users form a serialisation of the things they look at and pay attention—an exemplar of which can be seen in eye movement sequences of users. We also suggest that web designers have a narrative in mind to be experienced by users, and they create a visual sequence they wish their audience to perceive for supporting this narrative. However, this sequence is typically lost when we move from visual presentations to auditory ones. Current audio interactions centre around page linearisation based on the sequence of the underlying source code. This linearisation typically falls short of the kind of comprehensive interaction which can be expected in the visual domain. In this paper, we use an eye-tracking dataset to illustrate that the linearisation of web page component based on the underlying source code differs from what is experienced by sighted users. We then show that the web experience of visually disabled users can be improved by reordering the most commonly used web page components based on the order in which they are used. We also suggest that it is critical to conduct formative experimentation with sighted users to establish a visual narrative and serialisation, thereby informing the design of the auditory conversation.

Notes:

AudioFunctions.web: Multimodal Exploration of Mathematical Function Graphs

Dragan Ahmetovic, Università degli Studi di Torino; Cristian Bernareggi, Università degli Studi di Milano; João Guerreiro, Carnegie Mellon University; Sergio Mascetti, Università degli Studi di Milano; Anna Capietto, Università degli Studi di Torino

We present AudioFunctions.web, a web app that uses sonification, earcons and speech synthesis to enable blind people to explore mathematical function graphs. The system is designed for personalized access through different interfaces (touchscreen, keyboard, touchpad and mouse) on both mobile and traditional devices in order to better adapt to different user abilities and preferences. It is also publicly available as a web service and can be directly accessed from the teaching material through a hypertext link.

An experimental evaluation with 13 visually impaired participants highlights that, while the usability of all the presented interaction modalities is high, users with different abilities prefer different interfaces to interact with the system. It is also shown that users with higher level of mathematical education are capable of better adapting to interaction modalities considered more difficult by others.

Notes:

Addressing the Situational Impairments Encountered by Firefighters through the Design of Alerts

Flynn Wolf, UMBC; Priyanka Soni, UMBC; Ravi Kuber, UMBC; Dianne Pawluk, Virginia Commonwealth University; Brian Turnage, City of Richmond Fire and Emergency Services

Situationally induced impairments and disabilities (SIIDs) are experienced by a range of users. Firefighters can be impacted when performing tasks under the inhospitable conditions often present at the scene of a fire (e.g., thick smoke and loud noise). In this paper, we describe the steps of an approach to support situational awareness (SA) among firefighters whose visual and auditory channels may be restricted while performing tasks. A structured multi-step approach was adopted to develop meaningful, perceivable cues that could aid in this process. In order to investigate the efficacy of alerts designed using this approach, cues were evaluated under simulated conditions in a lab. Findings revealed the benefits offered by visual signals when facing SIIDs, in contrast to their tactile and auditory counterparts. However, subjective comments revealed that tactile signals, if designed appropriately, may offer promise to support decision making among firefighters who often encounter SIIDs.

Notes:

Exploring feasibility of wrist gestures for non-visual interaction with wearables

Shirin Feiz, Stony Brook University; IV Ramakrishnan, Stony Brook University

The emergence of wearable devices such as smartwatches is spurring new user interface designs and interaction modalities for these devices. One such new input modality for interacting with smartwatches is wrist gestures. Smartwatches are beginning to support a set of wrist gestures allowing for a range of one-handed interactions with these devices. Wrist gestures are particularly appealing for people with vision impairments (PVI) as touch-based interaction with smartwatch screens is quite challenging for them. However, the question of how accessible are wrist gestures for PVI to interact with wearable devices remains unexplored. To this end, we conducted a user study to explore this question. The study reveals the accessibility barriers of the current generation of wrist gestures and sheds insight on how to make them accessible for PVI.

Notes:

Personalised and Accessible TV Interaction for People with Visual Impairments

Daniel Costa, Universidade de Lisboa; Carlos Duarte, Universidade de Lisboa

Connected TV refers to any TV or set-top box that can be connected to the internet providing access to additional content such as TV applications, web browsing and communication with other devices in the network. These new features turn TV devices into more versatile and interesting platforms but also clog the screen with more content, making TVs more inaccessible for people with visual impairments. This paper presents the design and implementation of a solution that explores multiple modalities, personalization and allows users to control TV applications from their mobile devices, taking advantage of the accessibility features of the latter.

Notes:

Session 7: Google Doctoral Consortium – Presentation Session

Comprehensive Accessibility of Equations by Visually Impaired

Akashdeep Bansal; Indian Institute of Technology Delhi, India

Persons with visual impairments can access digital information through text-to-speech based screen reading software. Still, accessing mathematical equations are challenging due to nonlinearity. We propose to improve accessibility of equations by associating a complexity metric with each equation and then use this metric to modify the rendering. For example, this will allow audio rendering of complex equations with appropriate variable substitution. Similarly, different choices of cues can be adopted on the basis of complexity of the equation. Further, personal optimization can be done through cognitive analysis of listening ability, familiarity with the content and educational background of the user.

Notes:

Comparative Analysis Of Web Accessibility Standards And Regulations

Shantanu Ladkat; Sinhgad Institute of Management and Computer Application, Pune University, Pune, India

Web accessibility is a developing and highly meticulous task. In order to achieve the most satisfactory results, different standards and regulations of web accessibility across various regions and organizations have to be compared and studied. Comparing accessibility standards would be done to address major outcomes like developing a tool which will provide systematic project estimate for specific accessibility standard. A tool such as this will impact managing accessibility projects significantly.

Notes:

Designing Mobile Persuasive Technology to Promote Mental Healthcare in Developing African Nations

Makuochi Samuel Nkwo; Ebonyi State University, Abakaliki, Nigeria

My research examines new ways of supporting people who suffer from mental health disorders to adopt positive mental healthcare behaviors and live happier lives. As a first step toward contributing to research, I conducted a user study 120 people in an African community to understand what strategies could be used to support people take on positive mental health behaviors. Findings from this study were carefully mapped to their corresponding persuasive techniques including reduction, personalization, and tailoring, reminders, and social learning. Using these techniques, I show how mobile persuasive system interventions could be designed to encourage positive mental healthcare behaviors, and bring about healthier and happier lives.

Notes:

Web Development Training for Students That Are Blind

Claire Kearney-Volpe; New York University, New York

Although technology can improve access and participation for people that are blind or with lowvision, barriers throughout engineering, and technology education limit the number of people seeking and retaining jobs in these fields. In the realm of computing, web development skills are the most sought after skill set relating to employability. The dissertation work proposed here is a mixed methods study of web development curricula created specifically for students with visual impairments that are interested in learning how to program. Specifically, this project comprises the development and evaluation of a 10-day course in web development. Here, I describe previous work in this area, research and curriculum design, as well as the significance of this project.

Notes:

Session 8: Ability Magazine Job Fair

ABILITY Job Fair is the first online platform that connects recruiters and job seekers with a broad range of accessibility features. They include Live Face to Face Video/Audio, screen reader compatibility, real-time captioning, sign language interpreters on standby, text-based messaging available with size and contrast.

No downloading of apps needed. Users only need a desktop computer, laptop computer, tablet or smartphone, webcam and microphone, Chrome or Firefox browser (iPhone/iPad use Safari.)

Chet Cooper, Accessibility Magazine

Session 9: Navigation

SafeExit4All: An Inclusive Indoor Emergency Evacuation System for People With Disabilities

Seyed Ali Cheraghi, Wichita State University; Anup Sharma, Wichita State University; Vinod Namboodiri, Wichita State University; Güler Aarsal, Envision Research Institute

Indoor wayfinding has remained a challenge for people with disabilities in unfamiliar environments. With some accessible indoor wayfinding systems coming to the fore recently, a major application of interest is that of emergency evacuation due to natural or manmade threats to safety. Independent emergency evacuations can be particularly challenging for persons with disabilities as there is usually a requirement to quickly gather and use alternative wayfinding information to exit the indoor space safely. This paper presents the design and evaluation of an inclusive emergency evacuation system called SafeExit4All that empowers people with disabilities (in addition to the general population) to independently find a safe exit under emergency scenarios. The Safe-Exit4All application drives an underlying accessible indoor wayfinding system with the necessary emergency evacuation system parameters customized to an individual's preferences and needs for exiting safely from a premise. Upon receiving an emergency alert, a user accesses the SafeExit4All system through an app on their smartphone that has access to real-time information about the threat, and simply follows on-screen turn-by-turn navigation instructions towards the closest safe exit. Human subject evaluations show Safe-Exit4All to be effective not just in terms of reducing evacuation time, but also in providing guidance that results in users taking deterministic, shorter, and safer paths to the exit most suitable for them.

Notes:

An Independent and Interactive Museum Experience for Blind People

Saki Asakawa, Carnegie Mellon University; João Guerreiro, Carnegie Mellon University; Daisuke Sato, Carnegie Mellon University, IBM Research; Hironobu Takagi, IBM Research; Dragan Ahmetovic, Carnegie Mellon University, University of Turin; Desi Gonzalez, The Andy Warhol Museum; Kris M. Kitani, Carnegie Mellon University; Chieko Asakawa, Carnegie Mellon University, IBM Research

Museums are gradually becoming more accessible to blind people who have shown interest in visiting museums and in appreciating visual art. Yet, their ability to visit museums is still dependent on the assistance they get from their family and friends or from the museum personnel. Based on this observation and on prior research, we developed a solution to support an independent, interactive museum experience that uses the continuous tracking of the user's location and orientation to enable a seamless interaction between Navigation and Art Appreciation. Accurate localization and context-awareness allow for turn-by-turn guidance (Navigation Mode), as well as detailed audio content when facing an artwork within close proximity (Art Appreciation Mode). In order to evaluate our system, we installed it at The Andy Warhol Museum in Pittsburgh and conducted a user study where nine blind participants followed routes of interest while learning about the artworks. We found that all participants were able to follow the intended path, immediately grasped how to switch between Navigation and Art Appreciation modes, and valued listening to the audio content in front of each artwork. Also, they showed high satisfaction and an increased motivation to visit museums more often.

Notes:

Impact of Expertise on Interaction Preferences for Navigation Assistance of Visually Impaired Individuals

Dragan Ahmetovic, Università degli Studi di Torino; João Guerreiro, Carnegie Mellon University; Eshed Ohn-Bar, Max Planck Institute for Intelligent Systems; Kris M. Kitani, Carnegie Mellon University; Chieko Asakawa, Carnegie Mellon University

Navigation assistive technologies have been designed to support individuals with visual impairments during independent mobility by providing sensory augmentation and contextual awareness of their surroundings. Such information is habitually provided through predefined audio-haptic interaction paradigms. However, individual capabilities, preferences and behavior of people with visual impairments are heterogeneous, and may change due to experience, context and necessity.

Therefore, the circumstances and modalities for providing navigation assistance need to be personalized to different users, and through time for each user.

We conduct a study with 13 blind participants to explore how the desirability of messages provided during assisted navigation varies based on users' navigation preferences and expertise. The participants are guided through two different routes, one without prior knowledge and one previously studied and traversed. The guidance is provided through turn-by-turn instructions, enriched with contextual information about the environment. During navigation and followup interviews, we

uncover that participants have diversified needs for navigation instructions based on their abilities and preferences. Our study motivates the design of future navigation systems capable of verbosity level personalization in order to keep the users engaged in the current situational context while minimizing distractions.

Notes:

Session 10: Designing for Neurodiversity

A Computer Anxiety Model for Elderly Users Interacting with the Web

Thiago Donizetti dos Santos, Federal University of ABC; Vagner Figueredo de Santana, IBM Research

Even nowadays, the use of computers can be difficult for some people. The reason for that can be complex and multifactorial, such as lack of experience in using computers, lack of knowledge, problems related to usability and accessibility, fear, intimidation, or anxiety. Some people can experience multiple levels of anxiety and, for high ones, they manifest what is known as Computer Anxiety. People with Computer Anxiety (PwCA) face problems when using computers or technology at home, in the workplace, or for study purposes, which might result in multiple forms of barriers. This work reports a study that involved a pilot (four elderly participants) and an experiment (39 elderly participants), contributing with a model that supports the identification of different levels of Computer Anxiety through the analysis of detailed interaction logs. Results show it is possible to automatically identify levels of Computer Anxiety in older adults while interacting with the web with 83.87 percent of accuracy. From the presented results, it is expected that specialists consider exploring the use of detailed interaction data and the presented model to identify Computer Anxiety levels, at scale, offering personalization, user interface simplification, removal of barriers, among other features to support this population.

Notes:

Designing Personalized Therapy Tools For People with Dementia

Sérgio Alves, Universidade de Lisboa; Filipa Brito, Universidade de Lisboa; Andreia Cordeiro, Liga dos Amigos da Terceira Idade; Luís Carriço, Universidade de Lisboa; Tiago Guerreiro, Universidade de Lisboa

Nonpharmacological interventions for people with dementia benefit from the usage of personalized materials. These are not always easy to obtain. In a set of formative studies, we looked at how clinical staff and families recur to the usage of biographical elements to stimulate and foster the self identity of people with dementia. Results showed that these stakeholders cherish biographically rich information although it is often hard to obtain relevant materials. We present the iterative design of Scrapbook, a web platform that supports psychologists in the process of collecting meaningful information about a person, and applying it in reminiscence and cognitive stimulation sessions. A three-phase deployment in a clinical setting allowed us to evolve the platform to respond to stakeholder requirements. Findings include a positive view of the developed features (e.g., biography enriched games, caregiver app, group therapy) but also an underwhelming usage of the platform. We discuss the adoption, usage patterns, and feedback collected from clinicians, seeking to inform the design of personalized, i.e., biographically rich tools for therapy settings.

Notes:

Adults with High-functioning Autism Process Web Pages With Similar Accuracy but Higher Cognitive Effort Compared to Controls

Victoria Yaneva, University of Wolverhampton; Le An Ha, University of Wolverhampton; Sukru Eraslan, Middle East Technical University; Yeliz Yesilada, Middle East Technical University

To accommodate the needs of web users with high-functioning autism, a designer's only option at present is to rely on guidelines that have not been empirically evaluated and do not account for the different levels of autism severity. Before designing effective interventions, we need to obtain an empirical understanding of the aspects that specific user groups need support with. This has not yet been done for web users at the high ends of the autism spectrum, as often they appear to execute tasks effortlessly, without facing barriers related to their neurodiverse processing style. This paper investigates the accuracy and efficiency with which high-functioning web users with autism and a control group of neurotypical participants obtain information from web pages. Measures include answer correctness and a number of eye-tracking features. The results indicate similar levels

of accuracy for the two groups at the expense of efficiency for the autism group, showing that the autism group invests more cognitive effort in order to achieve the same results as their neurotypical counterparts.

Notes:

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