

Visual Communication for Low-Vision Information Access

From Personalized Highlights to AI Agents

MY THESIS Personalized AI that **communicates visually**, supporting the **independence and agency** of low-vision people.



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“Motivated by my lived experience with low vision”

295 million people have low vision, and many prefer using their **residual vision**. Yet most research turns visuals into other modalities like speech or touch. Magnification techniques support residual vision, but they **fragment the view** and increase cognitive effort.

How can we communicate visual information in a visually accessible way?

TWO DIRECTIONS OF VISUAL COMMUNICATION

Tool → User

Projects 1, 2

Tools that **visually communicate visual information** to users, making the experience of visual perception accessible.

User → AI

Project 3

Users **communicate visually with AI tools** by sharing their view or indicating a point of interest, and get personalized support based on how they use their assistive tools.

Both ways

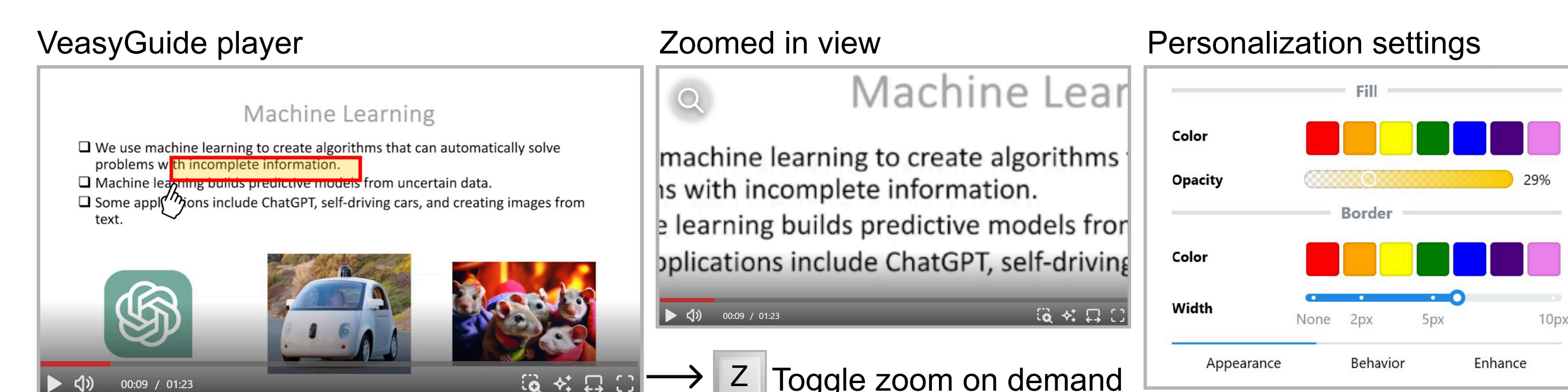
Project 4 (future)

AI systems that **share the user's visual context** and also **communicate visually** with users, making visuals visually accessible.

Towards **ability-based AI systems** that build on the residual vision and assistive tool use of people with low vision, for **personalized, in-situ visual support** through visuals.

1 VeasyGuide

ASSETS 25 Tool → User



Problem Instructors visually communicate by pointing, marking, or sketching on slides, but this communication is often hard to access and follow for people with low vision.

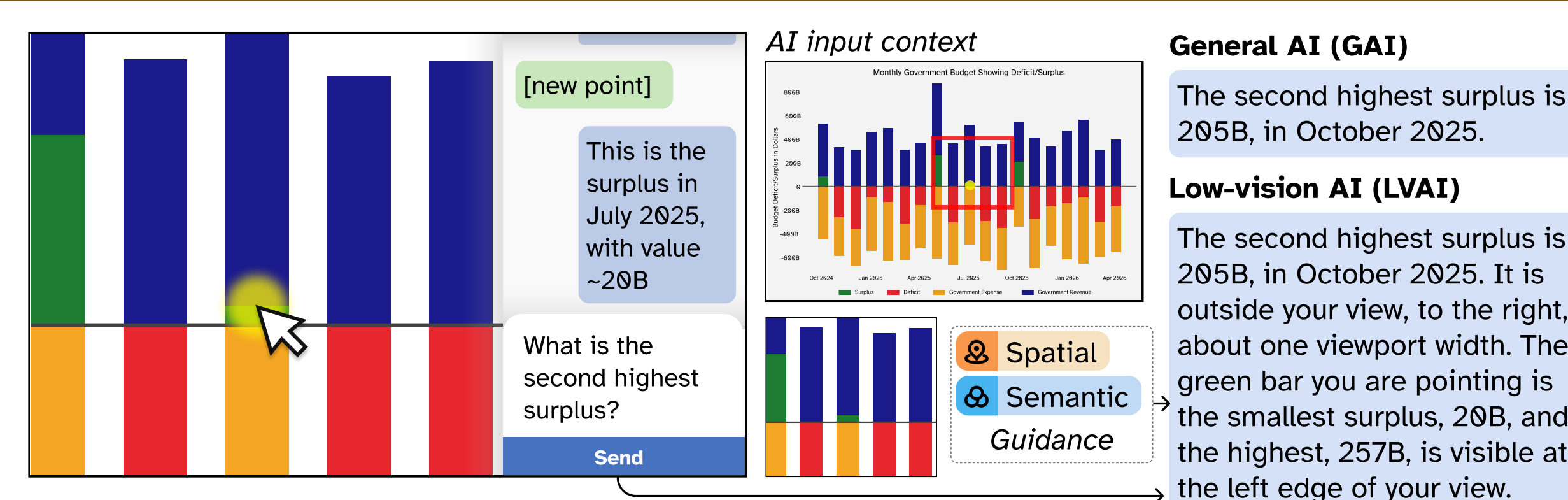
Approach Personalized highlights that follow instructor actions, co-designed with 3 low-vision partners.

Result Learners noticed **88%** of actions vs 61% without, with lower cognitive load, and more agency.

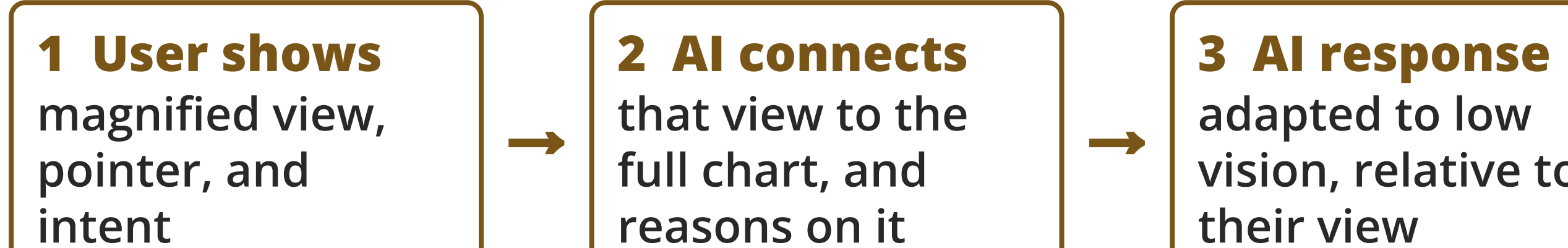
Lesson Making visual communication accessible using visual cues aids **both low-vision and sighted** learners.

3 Visual Context for AI

Ongoing User → AI



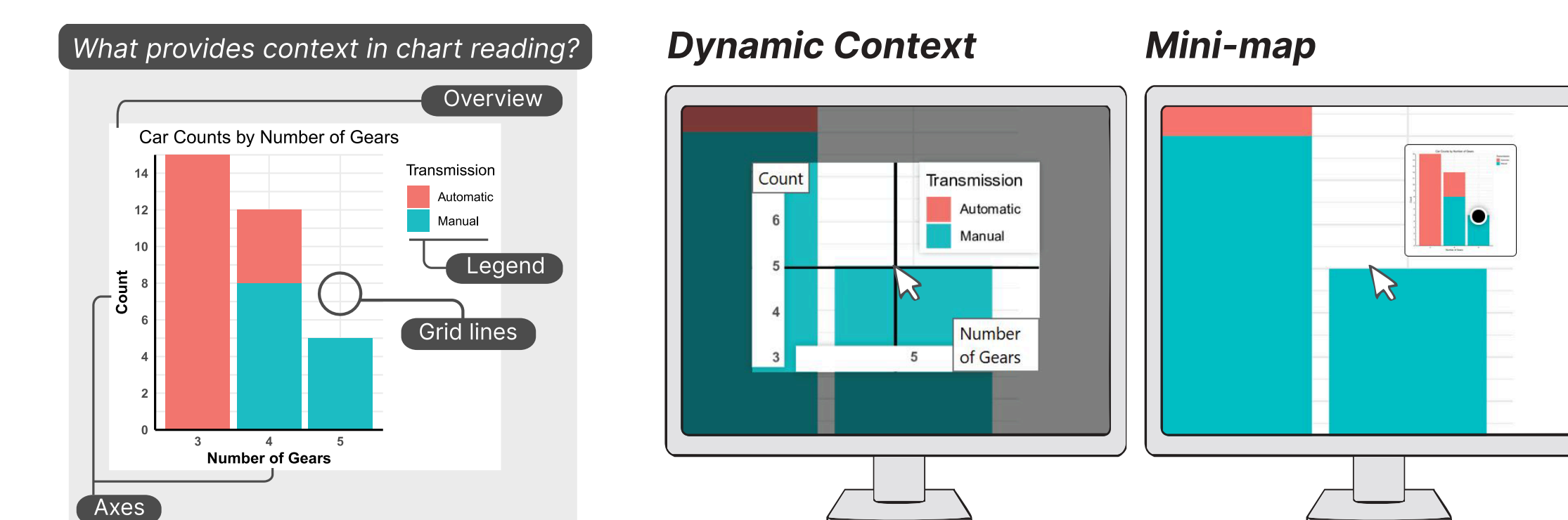
Idea Visual communication as context for AI agents, with responses adapted to low vision, grounded in that context.



Lesson Grounding the AI in the user's view is **necessary, but not sufficient**: its answers should also adapt to specific low-vision needs.

2 On-Cursor Visual Context

CHI 26 Tool → User



Problem Magnification makes chart details visible, but out-of-view context is fragmented and hard to access.

Approach Bring chart context to the pointer: Dynamic Context and Mini-map project context (axes, legend, grid lines, overview) around it.

Result For 22 low-vision participants, Dynamic Context **improved access and reduced effort**.

Lesson There is a **delicate tradeoff** between visual information cues and overwhelming amount of visuals.

4 Visual Dialogue with AI

Future Both ways

Open questions

Tell, highlight, guide, or show?

Which visual feedback fits which user and task?

Independence or dependence?

Does visual dialogue with AI breed a new dependence?

How do we measure agency?

Would AI create a new type of AI-supported agency?

Next The AI answers visually:



Making visual communication visually accessible for people with low vision and beyond.



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