ARTIFICIAL INTELLIGENCE (AI) FOR LANGUAGE REHABILITATION AFTER BRAIN DAMAGE

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ReAbility online
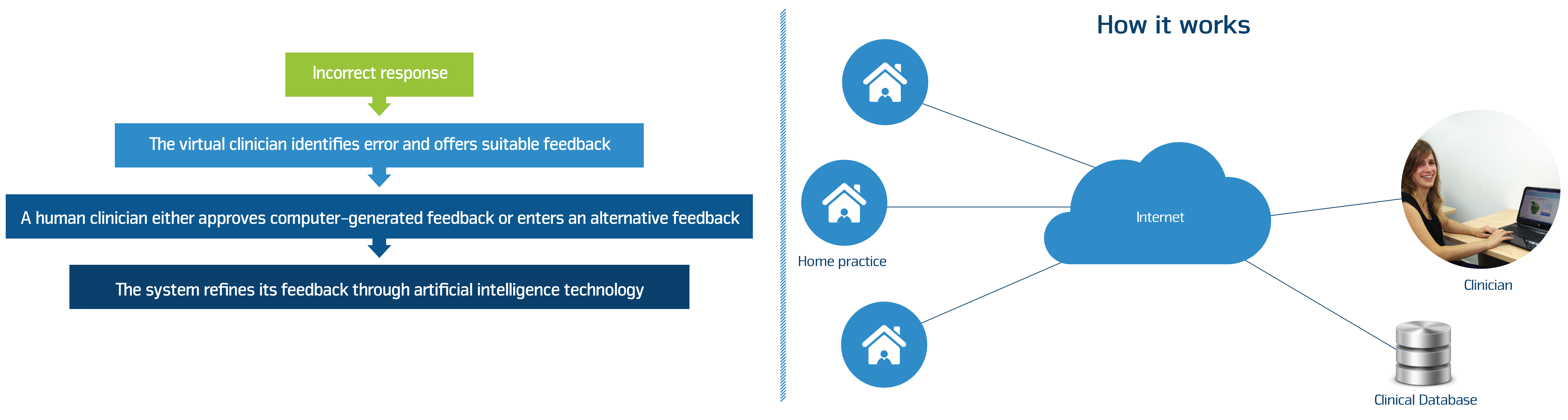movement & language rehabilitation

THE GERTNER INSTITUTE FOR EPIDEMIOLOGY AND HEALTH POLICY RESEARCH

Rationale for Tele-Language-Rehabilitation

- Intensive rehabilitation conducted over time improves ability after brain damage.
- Speech-language pathologists are unavailable in distant areas.
- Tele-rehabilitation saves money to both customers and paying agencies.
- Technological developments allow rehabilitation from home over the internet.

Tele-language system

- A custom-made web application.
- Computerized self-practice of various language exercises.
- Automated feedback tailored to the patient's language difficulties.
- One SLP can treat several patients simultaneously.

Incorrect response

The virtual clinician identifies error and offers suitable feedback

A human clinician either approves computer-generated feedback or enters an alternative feedback

The system refines its feedback through artificial intelligence technology

How it works

Home practice

Internet

Clinician

Clinical Database

Picture naming

כתוב מה בתמונה

שניה לבוש אבל זו לא התשובה

מכנסיים

בדוק

בקש רמז

Instruction: Write what you see in the picture

Feedback: Both are clothes but this isn't the right answer

Response: Pants

Check
Cue

Reading comprehension

השלם את המילים החסרות

על מנת לאפות ___עוגה___ יש להכין קמח, שמן, ביצים וסוכר. ניתן להוסיף לתערובת תפוחים, שזיפים או כל אחר. יש לאפות ב _____ בחום בינוני למשך ארבעים _____ .

בדוק

בקש רמז

Complete the missing words:
To bake a _____, you have to get flour, oil, eggs, and sugar. You can add apples, plums or any other _____ .
Put it in the _____ at medium heat for forty _____.

Odd one out

סמן מה לא שייך לקבוצת ירקות

בדוק

בקש רמז

Mark what does not belong to the vegetables

Goal: To test system feedback effectiveness on a picture naming task.
Method: Four patients with aphasia practiced twice per week over 1–3 months. Practice included linguistic tasks adjusted to their level.
Results: The virtual clinician gave appropriate feedback to a third of the errors.
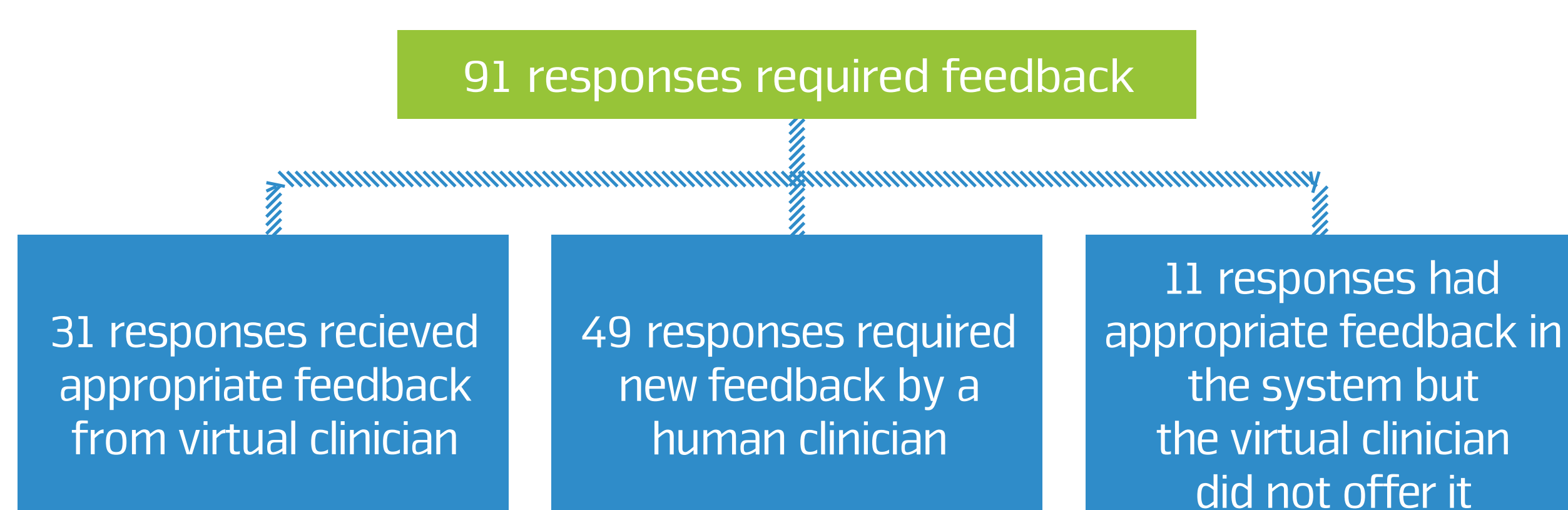
91 responses required feedback

31 responses recieved appropriate feedback from virtual clinician

49 responses required new feedback by a human clinician

11 responses had appropriate feedback in the system but the virtual clinician did not offer it

Figure 1: Feedback to patient responses

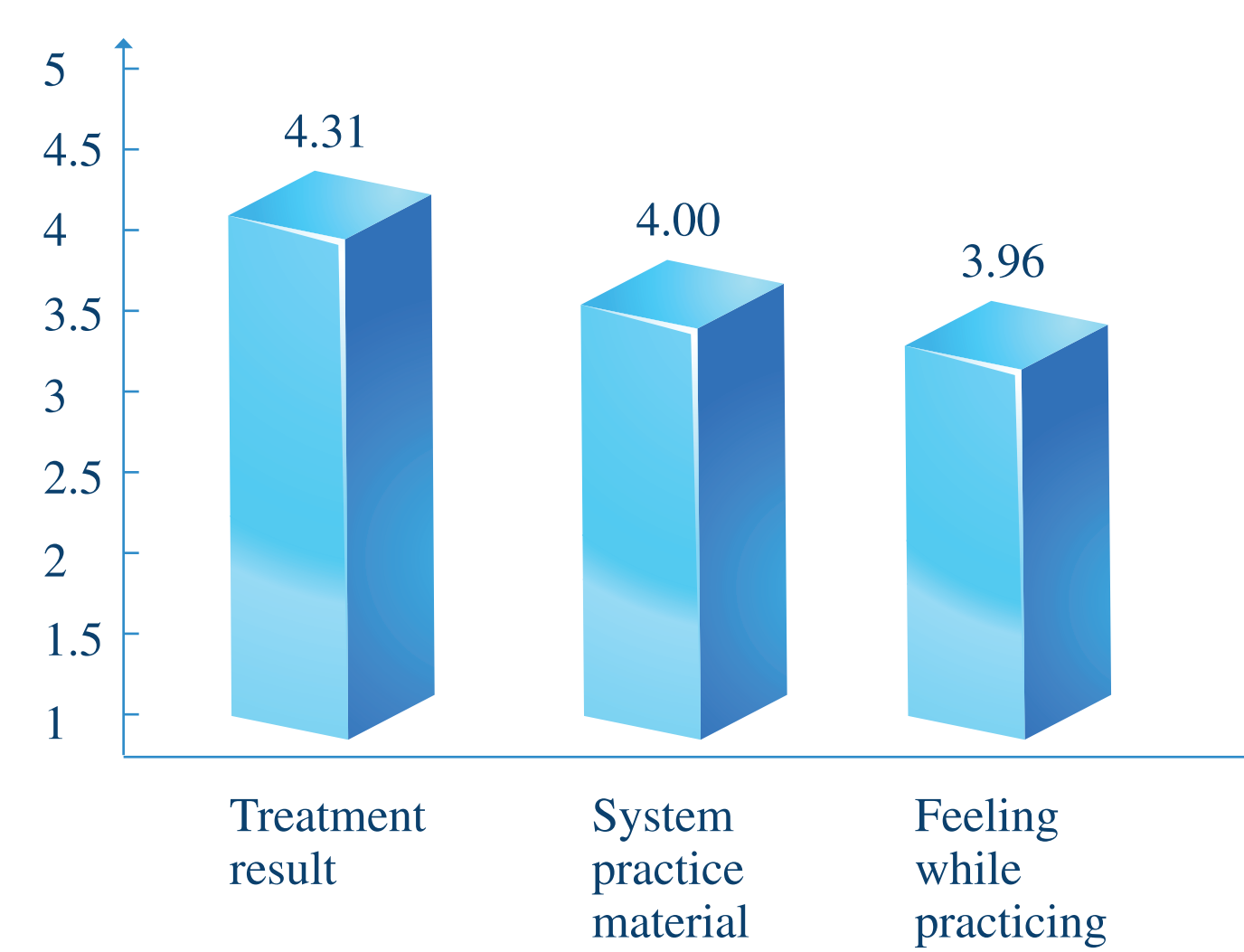|	Treatment result	System practice material	Feeling while practicing
	4.31	4.00	3.96

Figure 2: Patient responses on post-treatment satisfaction questionnaire (on a 1=unsatisfied to 5=highly satisfied scale)

Conclusion: We predict that as more patients practice, the system will learn more appropriate feedback for the different errors.