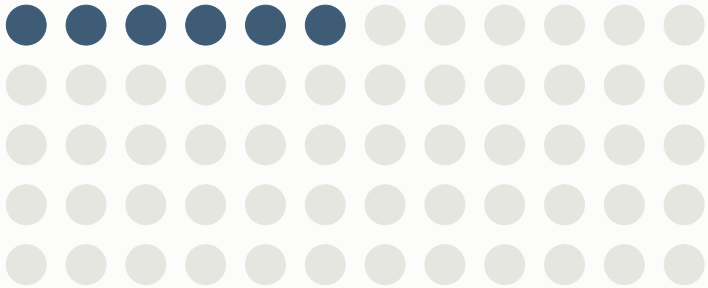

BICAMERAL
Six people who could not speak, and what they said.
First-in-human results · 18 months
Non-invasive language interface

BEFORE ANYTHING ELSE

Six is a small number.

Enough to show that something is possible. Nowhere near enough to show it is reliable.

6 THIS STUDY



60 — THE STUDY THAT WOULD SETTLE IT

The last third of this talk is what we cannot conclude. Both halves are the result.

THE PROBLEM

Language intact. Output gone.

In severe anarthria the capacity for language is undamaged — vocabulary, grammar, intention, the sentence fully formed — and the motor pathway that would produce it is not available.

The person is not gone and has not changed. The channel has closed.



WHAT EXISTS TODAY

Current options, honestly described.

APPROACH	RATE	LIMITATION
Eye-tracking spellers	6–9 wpm	Exhausting; fails as gaze control degrades
Switch scanning	2–5 wpm	Requires one reliable voluntary movement
Implanted arrays	40–70 wpm	Craniotomy; small candidate population
Non-invasive decoding	12–18 wpm	Historically too inaccurate to use

Conversational speech is 120–150 wpm. Every number above is a description of how far from conversation these people currently are.

WHAT WE BUILT

A non-invasive interface that decodes intended speech.

A dense sensor array worn externally, a decoder trained per person over roughly six weeks, and a language model constrained to that person's own vocabulary and idiom, assembled from writing they produced before they lost speech.



METHOD

Three stages.

1 ACQUIRE



128 channels, 2 kHz

→

2 DECODE



phoneme posteriors

→

3 ASSEMBLE

“…I can hear her.”

constrained to their own idiom

The third stage is the one that makes this work and the one that should worry you. We return to it in the limitations.

COHORT

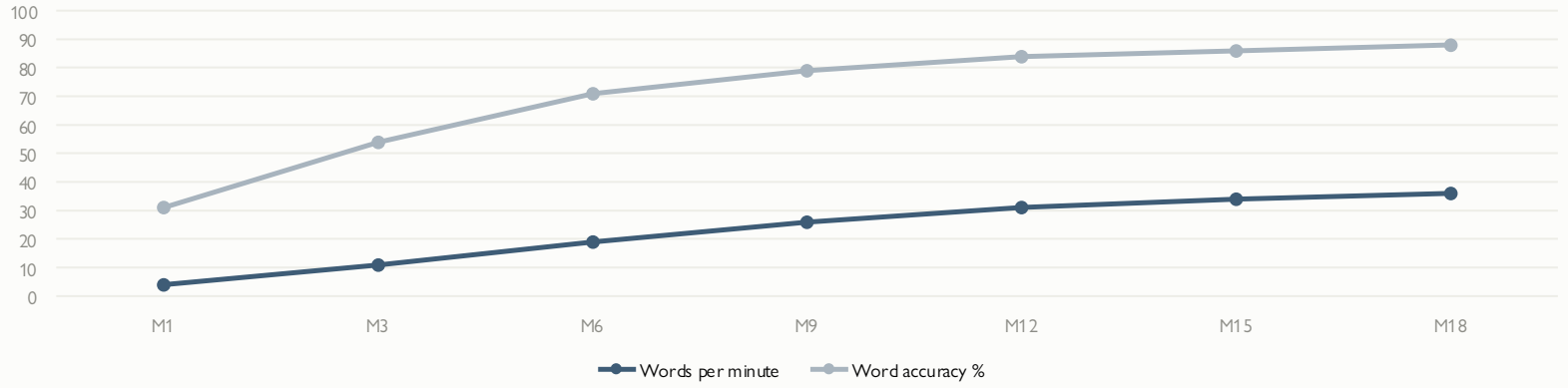
Who took part.

ID	AETIOLOGY	YEARS WITHOUT SPEECH	MONTHS ENROLLED
01	Brainstem stroke	7	18
02	Brainstem stroke	3	18
03	Motor neurone disease	2	16
04	Traumatic injury	11	14
05	Motor neurone disease	1	12
06	Brainstem stroke	5	12

All six retained intact comprehension and consented personally, without a proxy.

PRIMARY ENDPOINT

Words per minute, and whether the words were the right ones.



RESTORED SPEECH · VERBATIM

“Tell my daughter I can hear her.”

DECODED RESOLVED BY THE LANGUAGE MODEL

PATIENT 03 · MONTH 14 · FIRST UNPROMPTED SENTENCE

RESTORED SPEECH · VERBATIM

“I would like to be asked things, not told things.”

DECODED RESOLVED BY THE LANGUAGE MODEL

PATIENT 01 · MONTH 11 · UNPROMPTED, DURING CALIBRATION

RESTORED SPEECH · VERBATIM

“It is still me in here. It was always me.”

DECODED RESOLVED BY THE LANGUAGE MODEL

PATIENT 04 · MONTH 16 · UNPROMPTED

WHAT THE TRANSCRIPTS DO NOT SHOW

You have just read the best ones.

3

sentences shown

41,000

decoded across eighteen months



About one decoded sentence in eight is wrong in a way the person then has to correct.

They are here because they are what the participants chose to say. A talk that showed only the aggregate would be a different kind of dishonest.

LIMITATIONS

What this study cannot establish.

01	Six people is not a population	The most favourable cohort that exists — motivated, intact, supported at home.
02	The language model does real work	We cannot always separate what was decoded from what was predicted.
03	No blinding is possible	Assessors were separate, but nobody involved was naive.
04	Eighteen months is short	Signal quality drifted in two participants after month twelve.

Every one of these is stated at the same size as the results, on purpose.

THE SECOND LIMITATION, EXPANDED

How much of the sentence was the person?



The difference was not invented — the model is constrained to the person's own idiom, and usually chooses between candidates the decoder already ranked. But we cannot prove that in every case, and two participants have reported a sentence that was not what they meant.

SAFETY

Adverse events.

EVENT	N	SEVERITY	RESOLVED
Skin irritation at sensor contact	4	Mild	Yes
Fatigue after long sessions	6	Mild	Session limits
Distress at decoding error	2	Moderate	Protocol changed
Device-related serious event	0	—	—

The third row changed the study. After the second occurrence we added a confirmation step before any sentence is spoken aloud to a third party.

WHAT WE ARE NOT CLAIMING

Four sentences we will not say.



- That this restores speech. It restores a channel, at a third of conversational rate.
- That it will work for people with different aetiologies. We have tested three.
- That accuracy will keep improving. It has flattened since month twelve.
- That this is ready. It is one study, six people, and one site.

NEXT

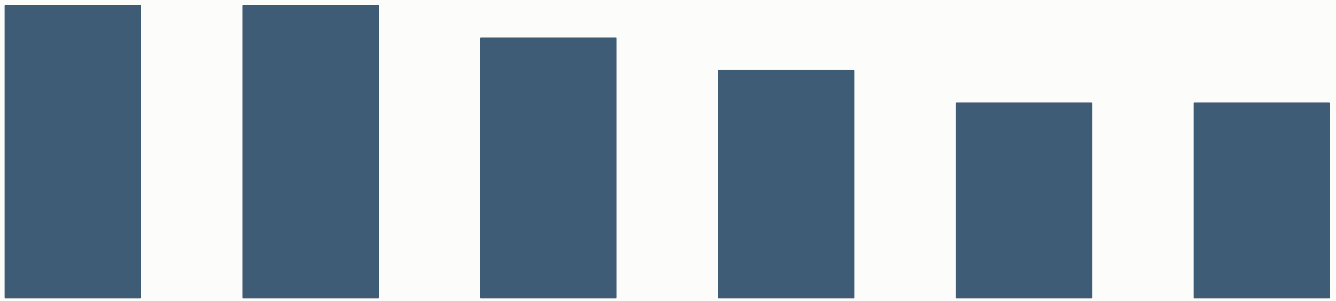
The study that would settle it.

PARAMETER	THIS STUDY	NEXT STUDY
Participants	6	60
Sites	1	9
Aetiologies	3	6, prespecified
Duration	18 months	36 months
Model-disabled arm	post hoc	Prespecified, randomised

The last row matters most. Until the language model's contribution is measured prospectively, the central question about this method remains open.

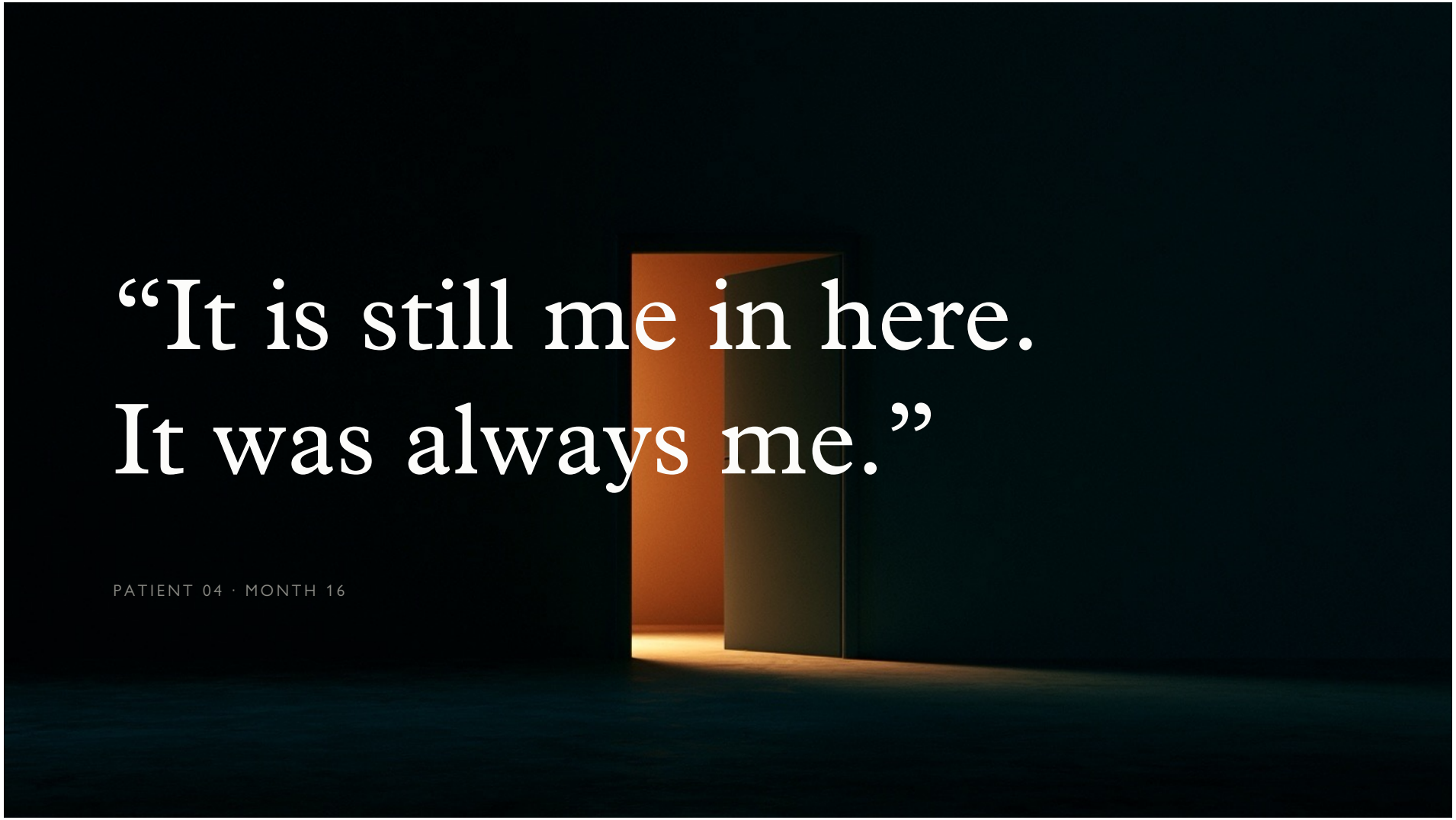
WITH THANKS

Six people gave eighteen months to a device that might not work.



MONTHS ENROLLED

They sat through sessions that produced nothing for weeks. They are named in the paper, at their own request.


“It is still me in here.
It was always me.”
PATIENT 04 · MONTH 16

COLOPHON

Bicameral is a fictional company invented for the purpose of demonstrating presentation design. Every participant, transcript, figure and adverse event in this deck is invented. Nothing here describes a real study, a real device, or a real person, and none of it should be read as clinical information.