

Man versus Machine: Evaluating IVR versus a Live Operator for Phone Surveys in India

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Live operator versus IVR

	Live	IVR
Set-up required	None	More
Personal and real conversation	Yes	No
Script	Flexible	Fixed
Personnel required	More	Less
Scalability	Difficult	Easy
Flexibility of Timings	Less	More
Accuracy and cost	?	?

What's Known about IVR Accuracy?

- Lerer et al [[DEV 2010](#)] measured task completion through phone surveys in rural Uganda
 - Does not measure IVR entry accuracy
- Measuring accuracy of SMS, electronic forms, live operator [[Patnaik et al](#)]
- Spoken versus typed input
[[Patel et al](#)] [[Grover et al](#)] [[Sherwani et al](#)] [[Medhi et al.](#)]
- Measuring bias in IVR surveys
[[Dillman et al](#)] [[Kreuter et al](#)] [[Schroder et al](#)]
- Systems for building IVR
[[Freedom Fone](#)] [[Awaaz.De](#)] [[IVR Junction](#)] [[SpokenWeb](#)]

What's Known about IVR Cost?

“...handling a call through the IVR is cheaper than handling one with a live agent by a factor of 10...”

-- Buckstaff et al, *Benchmarking Customer Service Results from the 2007 APPA Survey, USA*

But what about in low-resource environment?

- Users have less education – can they use IVR?
- Labour costs are lower – is IVR a big savings?

Our Study

- Goal: evaluate accuracy & cost of IVR relative to live operator for conducting a job interview
- Accuracy: *consistency* of IVR relative to live human conversation (ground truth unknown)
- Methodology:
 - Contact known job seekers over the phone
 - Administer the same questionnaire **twice**:
 - IVR (with live operator introduction)
 - Live operator
 - Compare reported values for discrepancies

Focus on Drivers

- Accessible population
- More tech savvy
- Developed job questionnaire with input from:
 - Babajob
 - Online classified ads
 - Office transportation manager





Age
Marital Status
Education
Owns a commercial permit
Years as a driver and years driving with a licence
Daily work hours
Night-shifts
Part-time/ short-time jobs
Latest and expected monthly salaries
Personal mobile phone and vehicle
Local traffic knowledge (one-way)
Local traffic knowledge (landmark)
Posting outside home town
Wear uniform
Drive a foreigner
Do odd jobs in addition
Traffic tickets
Smoking and drinking habits
Languages comfortable in
How would one locate an unknown place

-  Personal Info
-  Professional Info
-  Language proficiency and ability to handle crises

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-  Multi-digit
-  Yes/no
-  MCQ
-  Free response

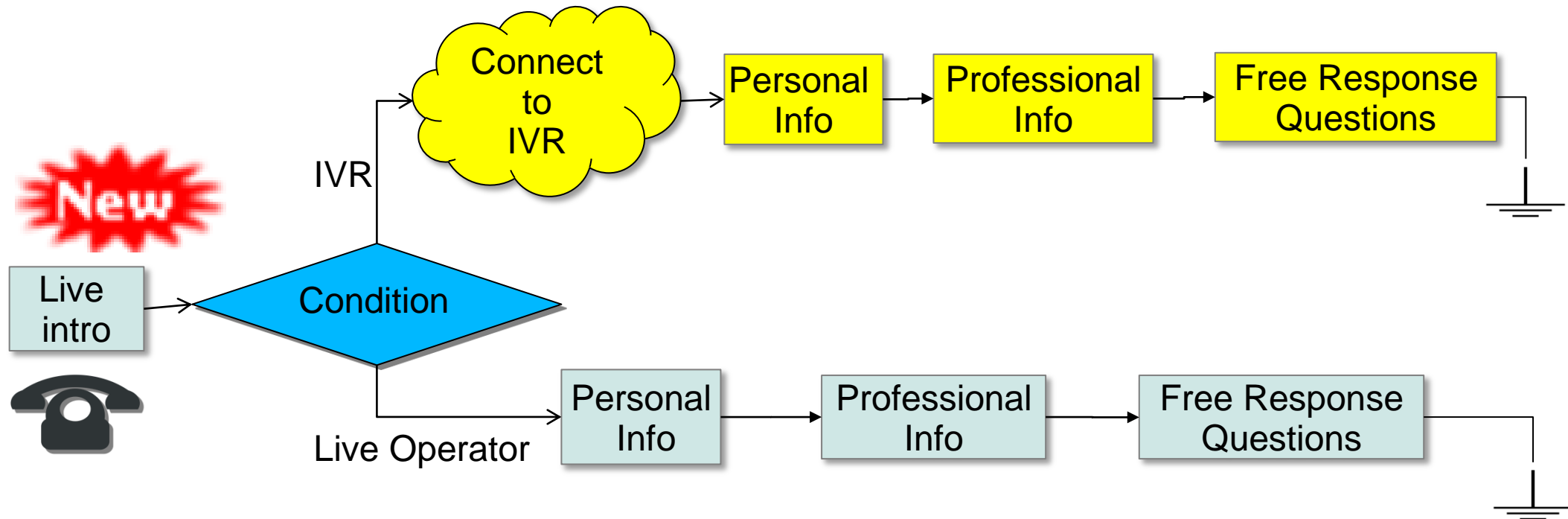
Age	Confirmation
Marital Status	No-confirmation
Education	Confirmation
Owns a commercial permit	No-confirmation
Years as a driver and years driving with a licence	Confirmation
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-  No-confirmation

Iterative Prototyping

- Stage one: Wizard-of-Oz with 3 known drivers
- Stage two: IVR system with 6 referred drivers
- Lessons learned:
 - Multi-digit answers are confusing; give examples
 - Enable skipping sensitive questions
 - Insert speed breakers for users answering before the question

Experimental Protocol



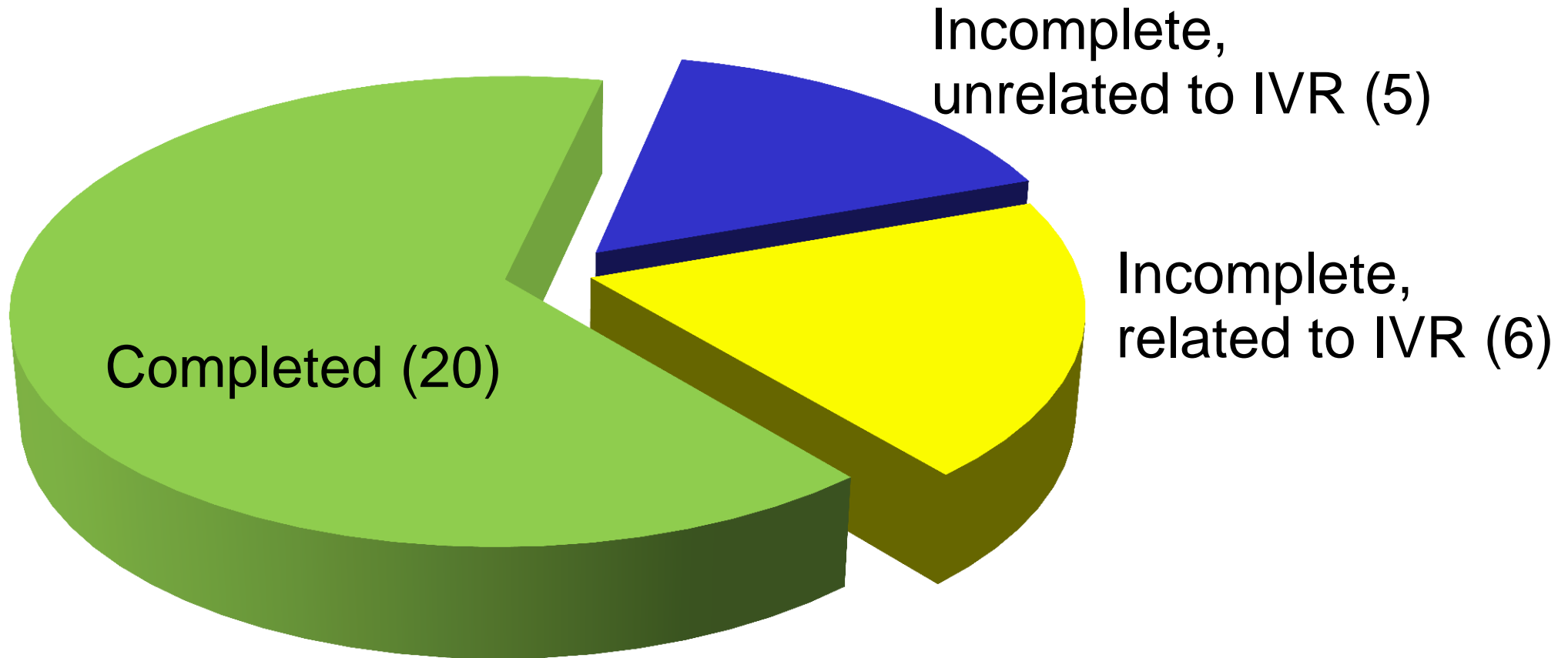
- Within-subjects design with two cases: IVR and live operator
 - Given twice in rapid succession (order balanced)
- Live introduction for both cases
 - Explain study, obtain consent
 - Explain how to use the IVR
- Paid Rs. 50 (\$1) in prepaid talktime for participation and referrals

Participants

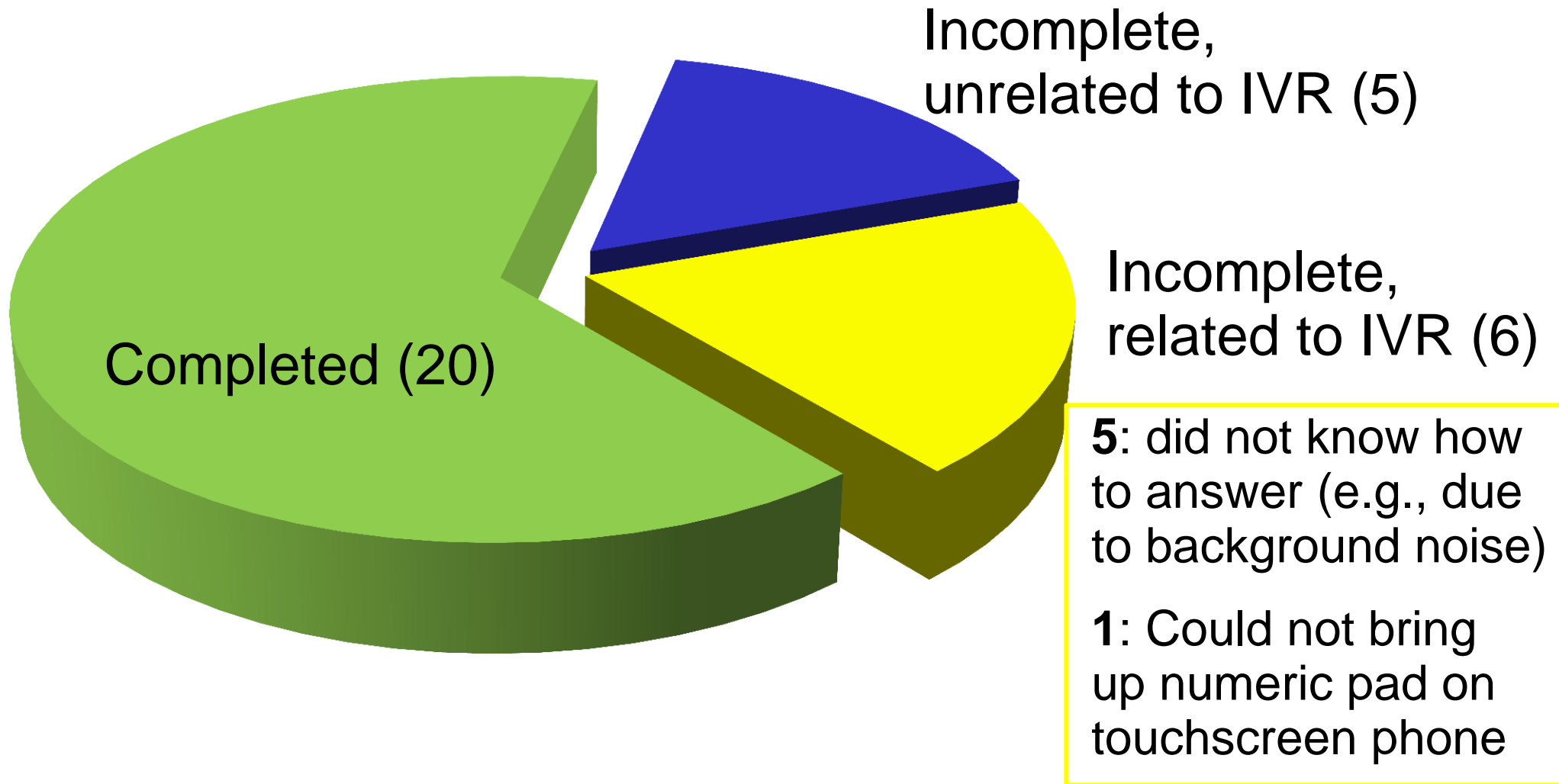
- Contacted 31 drivers in West Bengal
 - Babajob (21); click.in (1); Snowball sampling (9)
- All native Bengali speakers*, many looking for jobs
- Average demographics:
 - 31 years old
 - Usually <10 years education
 - Earning Rs. 8300 (\$160) / mo.
 - Usually owned feature phones and had used IVR before

* Because the interviewer spoke Bengali

Results: Task Completion

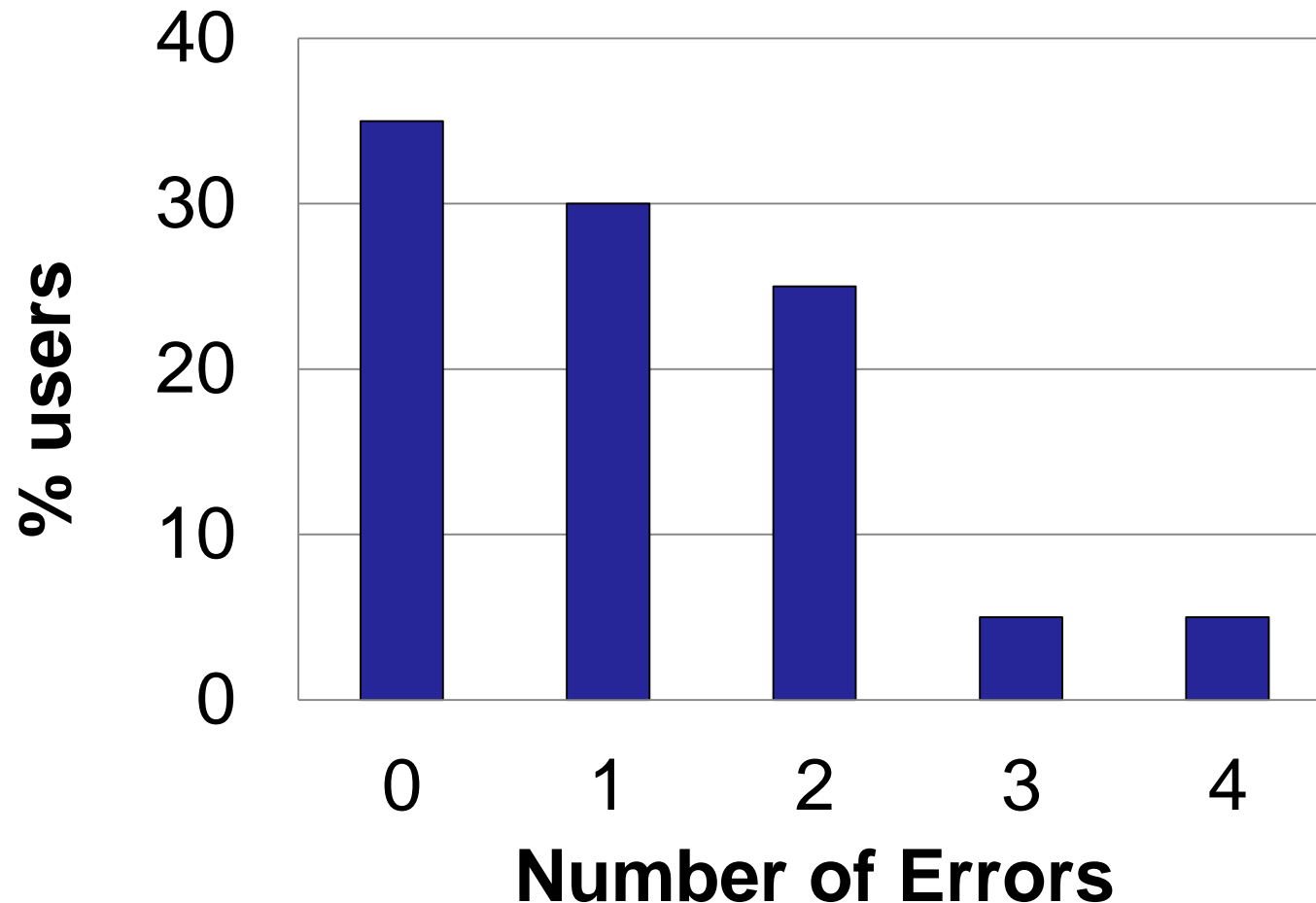


Results: Task Completion

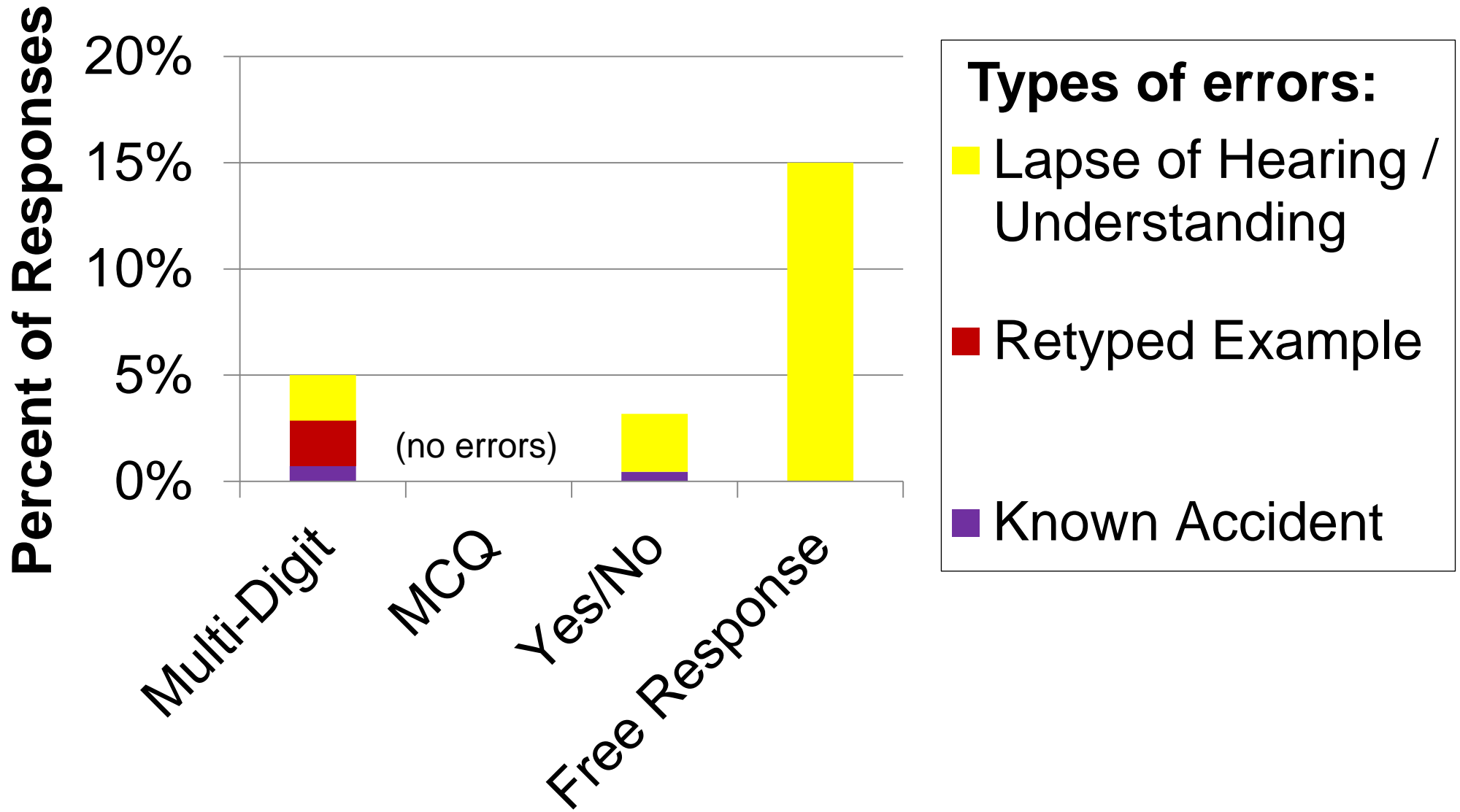


Results: Accuracy

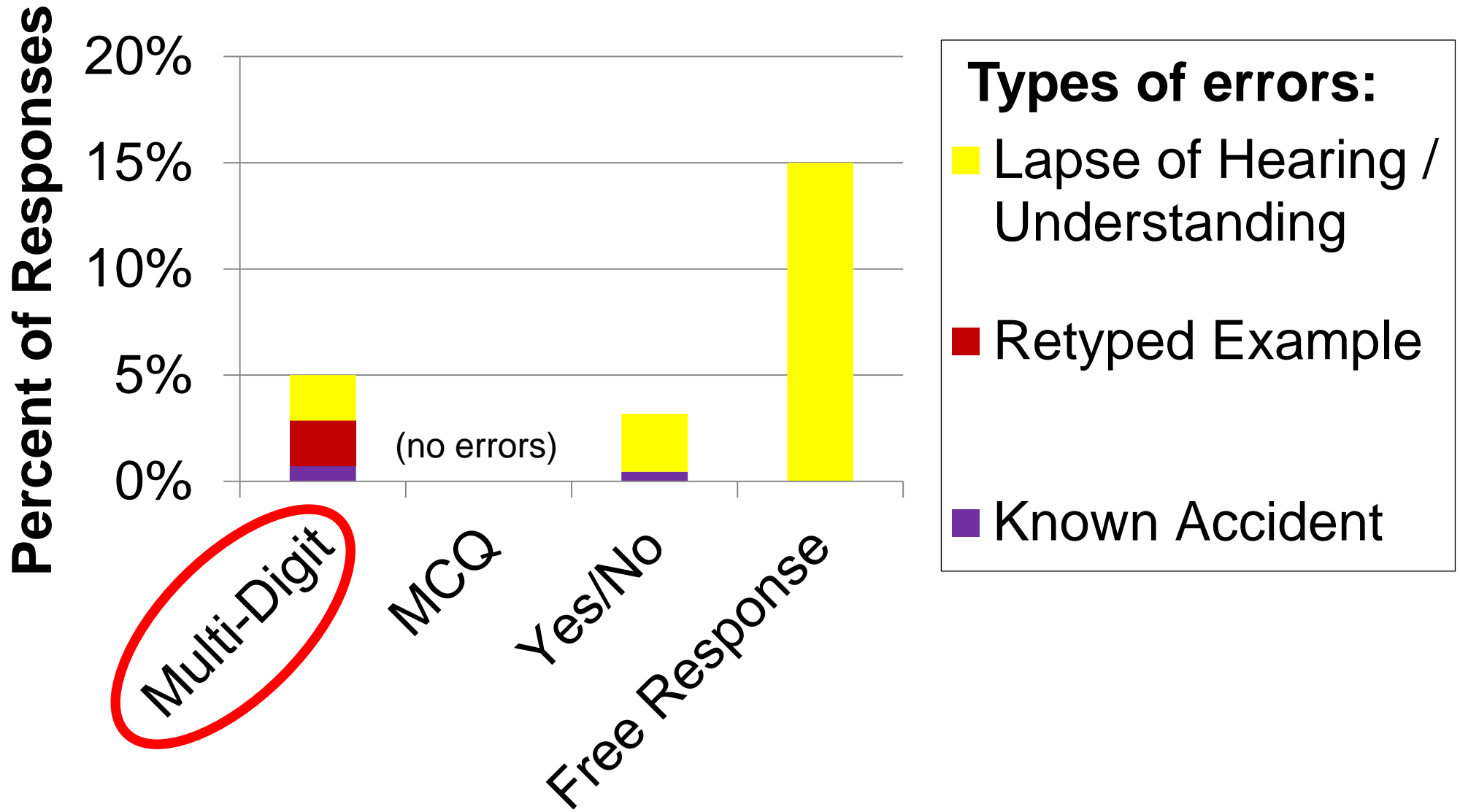
- **Overall error rate using IVR: 4.0%**
- On average, 1 question wrong per survey



Results: Source of Errors

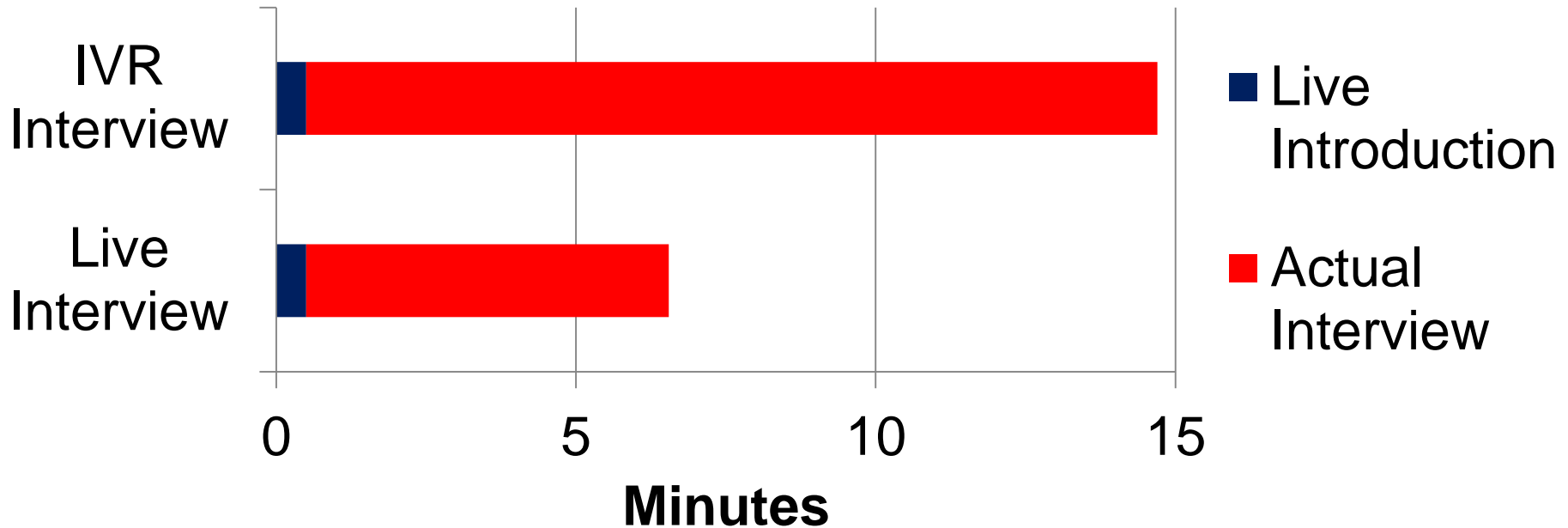


Results: Source of Errors



Confirmation prompts reduced errors in multi-digit responses by a factor of 1.6

Results: Speed



- IVR ~2.5x slower on the first interview
- IVR prompts have slow pace: take 12:20 to play

Results: Cost

- Components of cost:
 - Phone calls
 - Interviewer
 - Technical setup
 - Technical maintenance

**Operator paid Rs. 8,000 / mo.; phone calls 60p / minute*

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Today in India, a live operator costs about 3x as much as a phone call (per minute)*

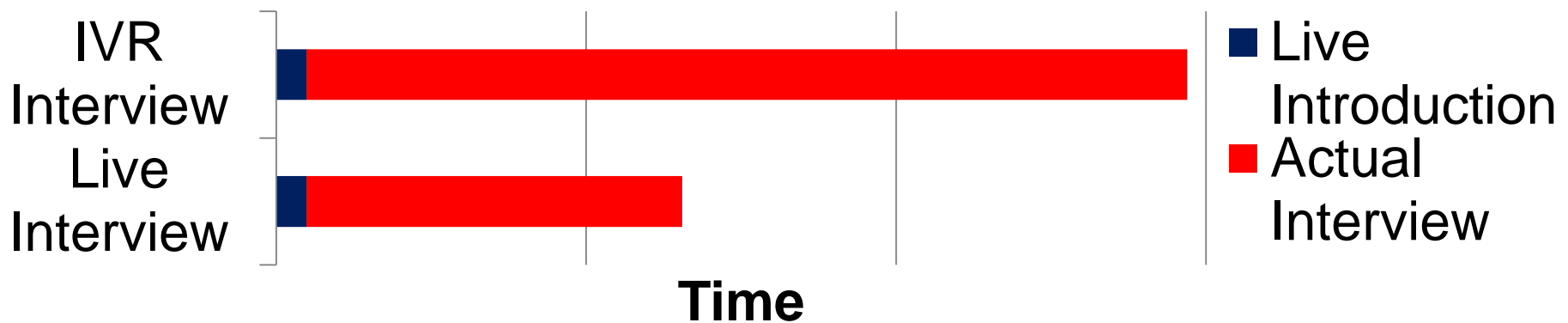
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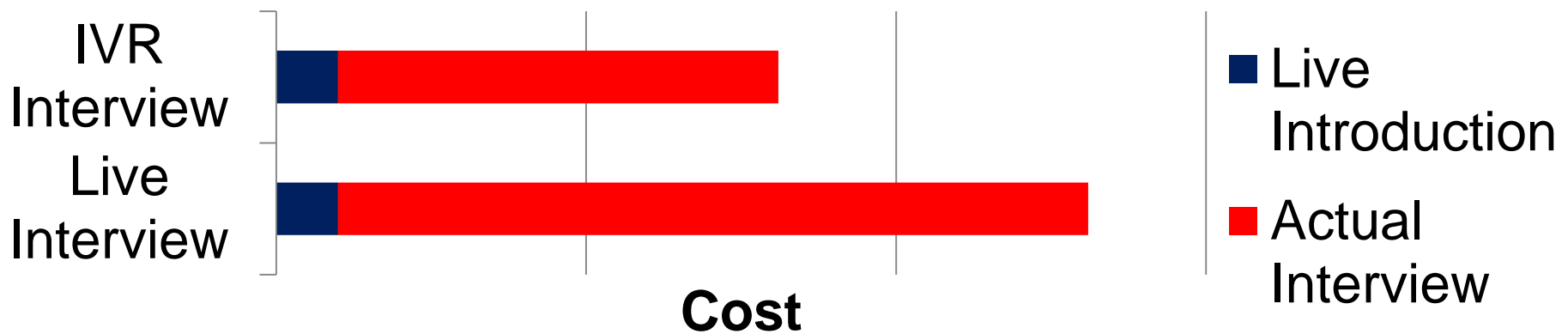
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# surveys (10 min each)	Interviewer + airtime savings by using IVR
1,000	\$200
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Discussion

- Choose IVR if:
 - Need fast scale-up (parallel calls, flexible hours of operation, multiple languages)
 - Able and willing to set up the IVR and undertake periodic maintenance
 - Tolerant of some errors (~4.0%) in the data
- Choose live operator if:
 - Willing to hire and manage more personnel
 - Want maximum flexibility and robustness for users
 - Less need for rapid scale / have a small client-base

Conclusions

- It is viable to conduct IVR interview with low-income users
 - Using a live operator for the introduction
 - 77% of users complete the call
 - 4.0% error rate in ecologically-valid setting
- Future avenues for improving IVR
 - More combinations of human and IVR
 - Dedicated undo button?
 - Automated assistant (or help key) for users stuck