

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

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# Live operator versus IVR

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

# 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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-  Personal Info
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-  Multi-digit
-  Yes/no
-  MCQ
-  Free response

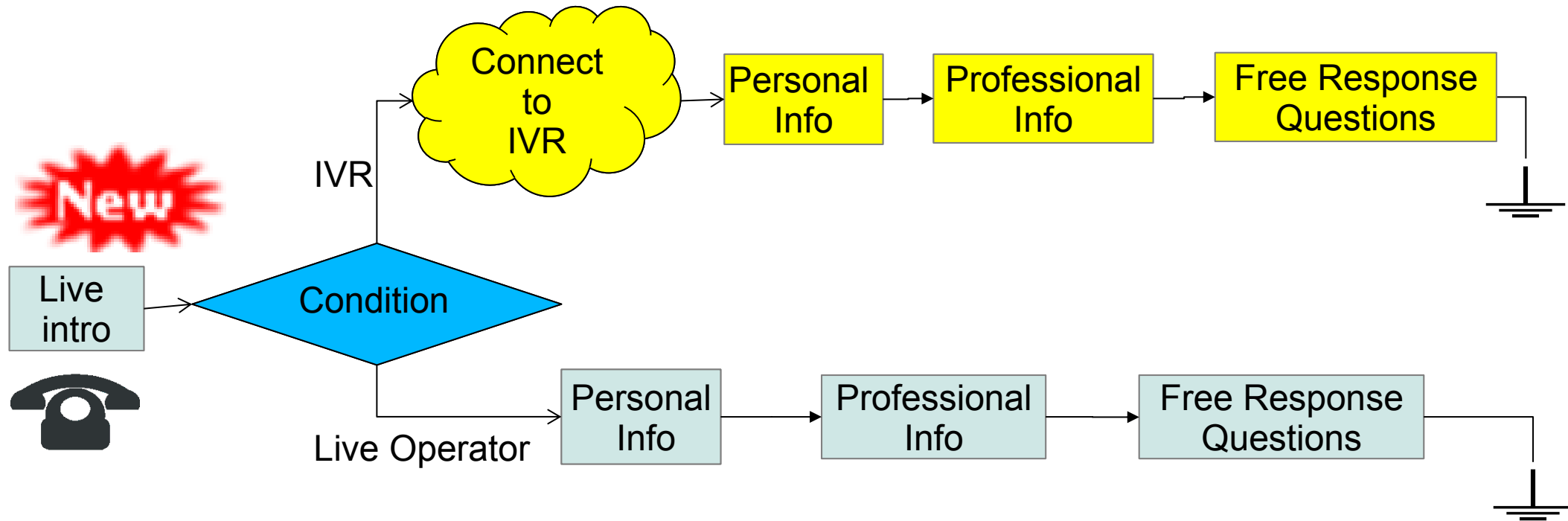
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-  Free response
-  Confirmation
-  No-confirmation

# 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



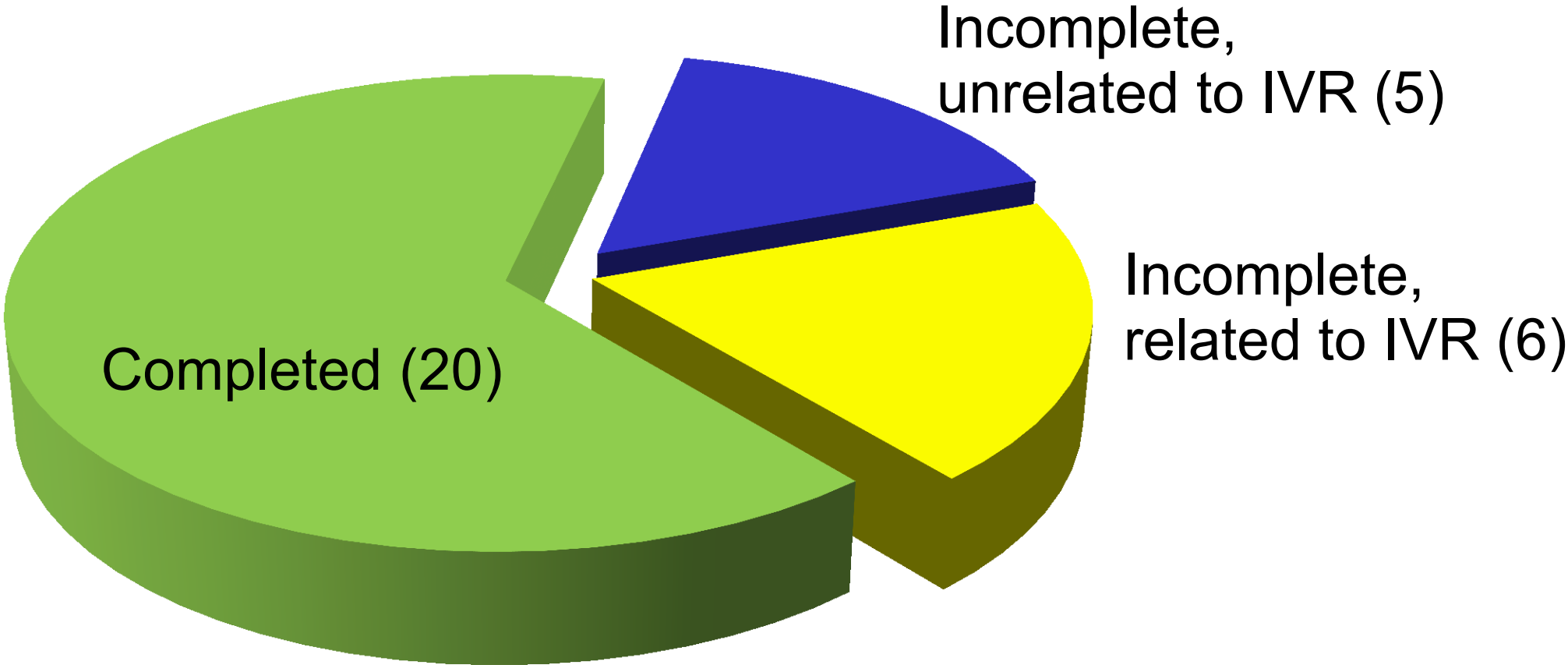
- Within-subjects design with two cases: IVR and live operator
  - Given twice in rapid succession (order balanced)
- Live introduction for both cases
  - Explain study, obtain consent
  - Explain how to use the IVR
- Paid Rs. 50 (\$1) in prepaid talktime for participation and referrals

# Participants

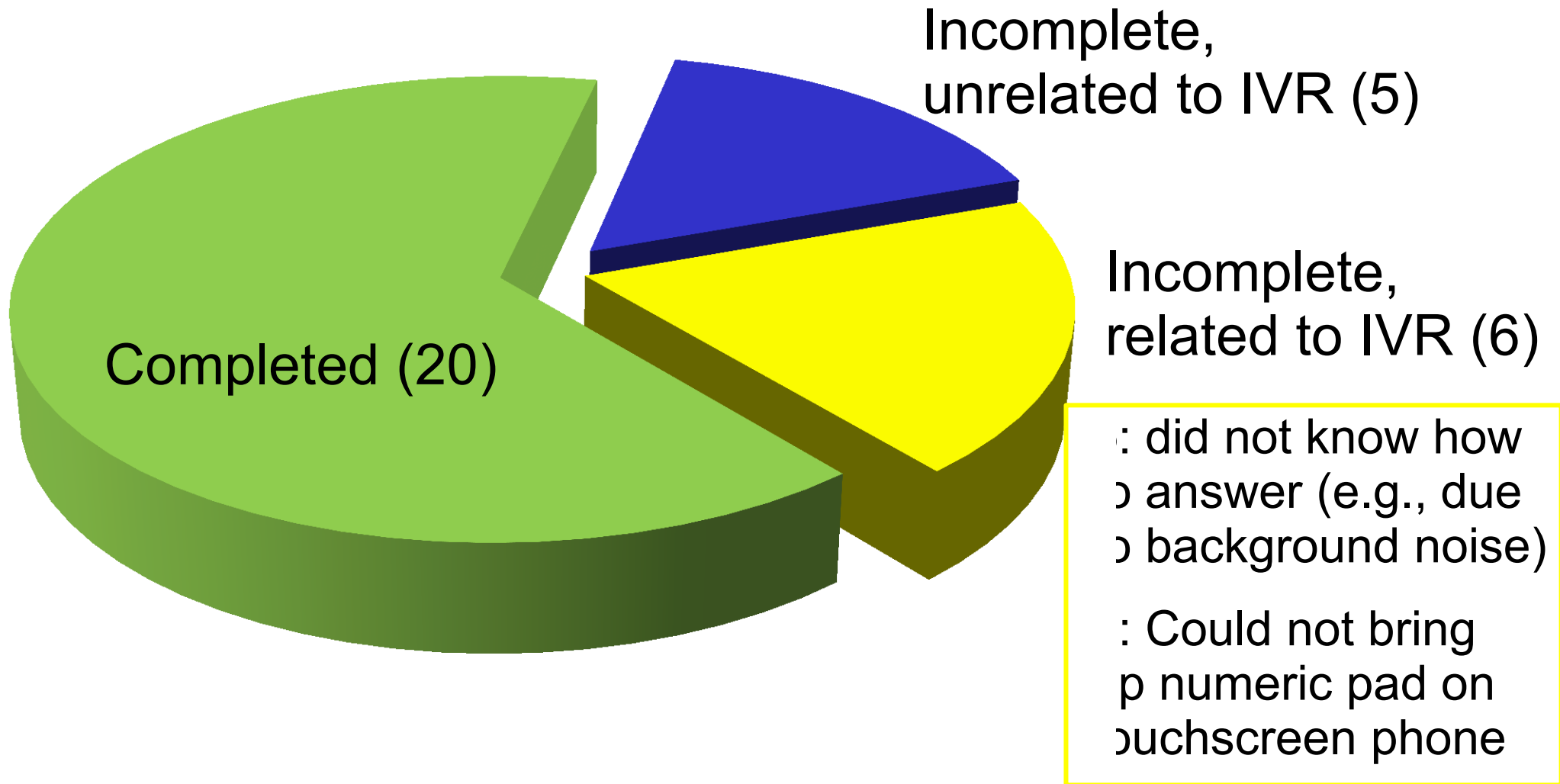
- Contacted 31 drivers in West Bengal
  - Babajob (21); click.in (1); Snowball sampling (9)
- All native Bengali speakers\*, many looking for jobs
- Average demographics:
  - 31 years old
  - Usually <10 years education
  - Earning Rs. 8300 (\$160) / mo.
  - Usually owned feature phones and had used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

\* Because the interviewer spoke Bengali

# Results: Task Completion

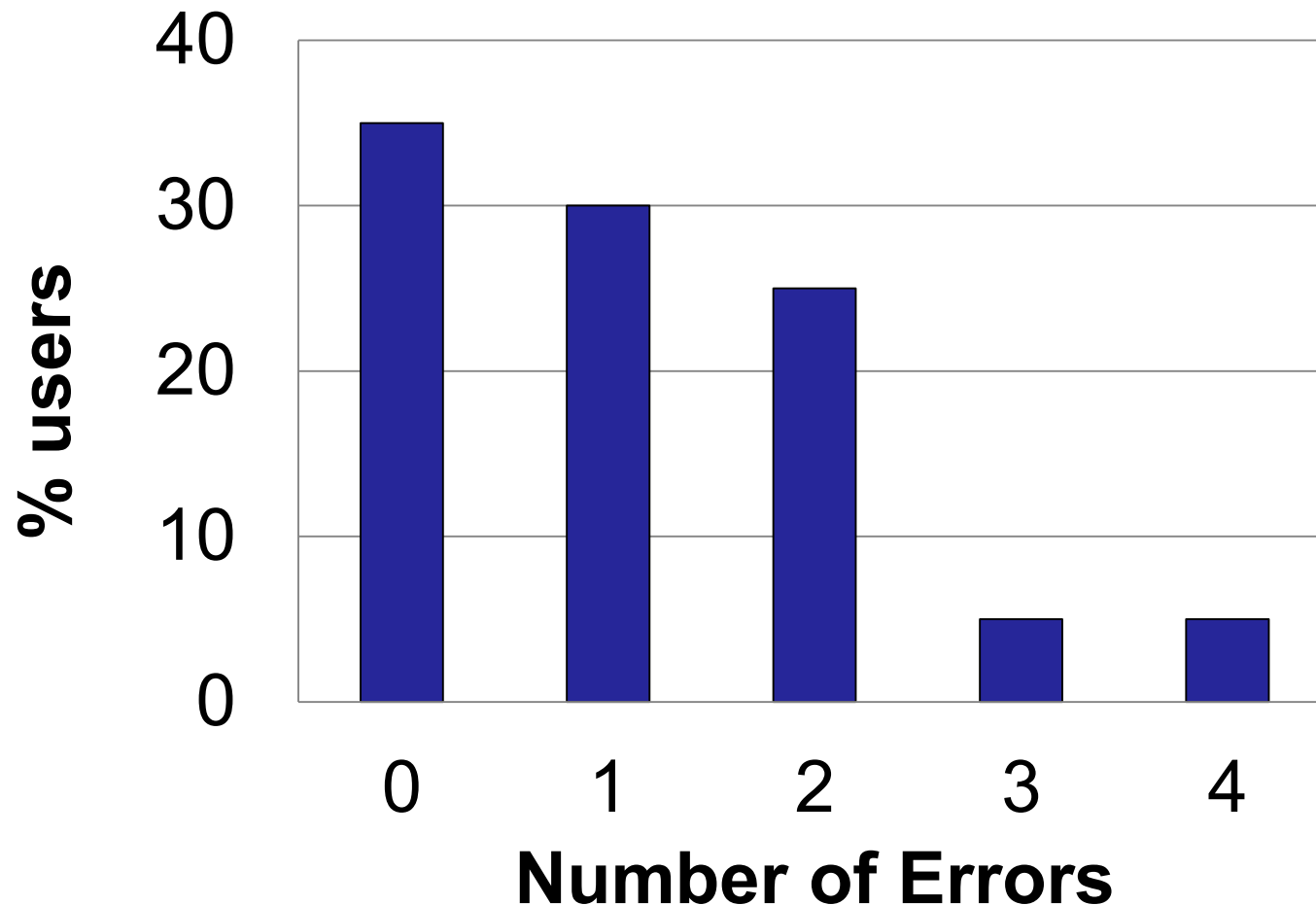


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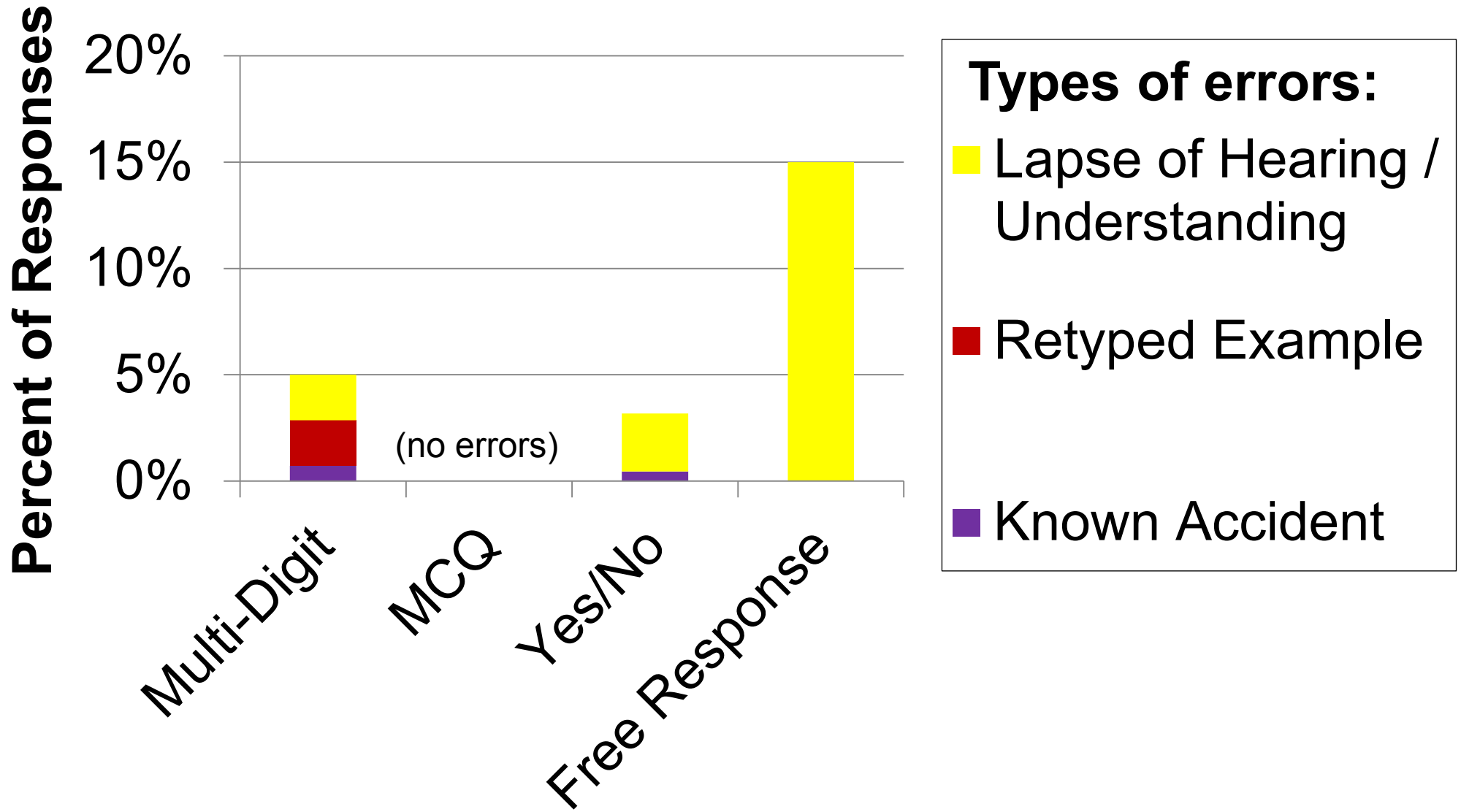
# Results: Accuracy

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

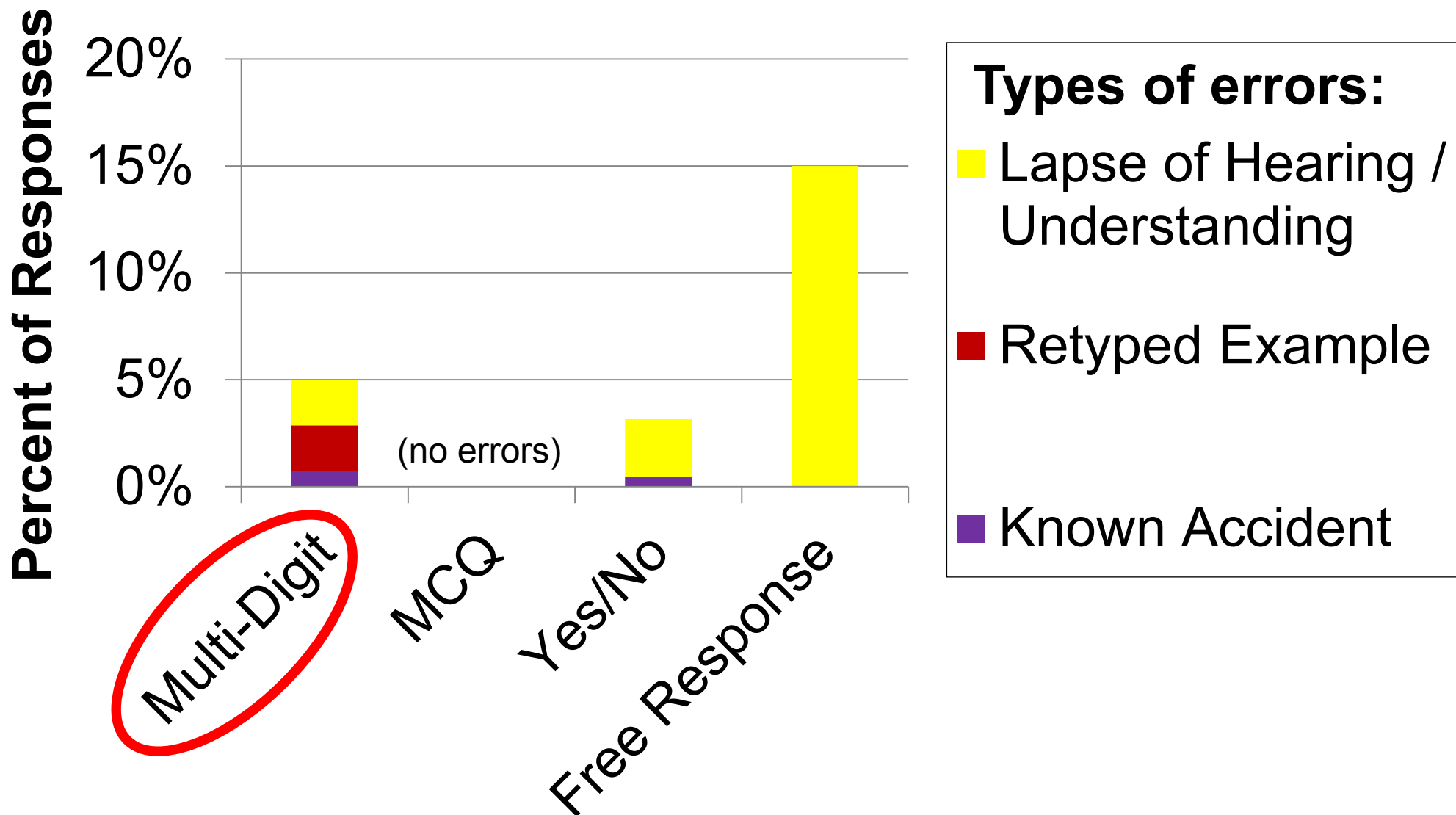




# Results: Source of Errors

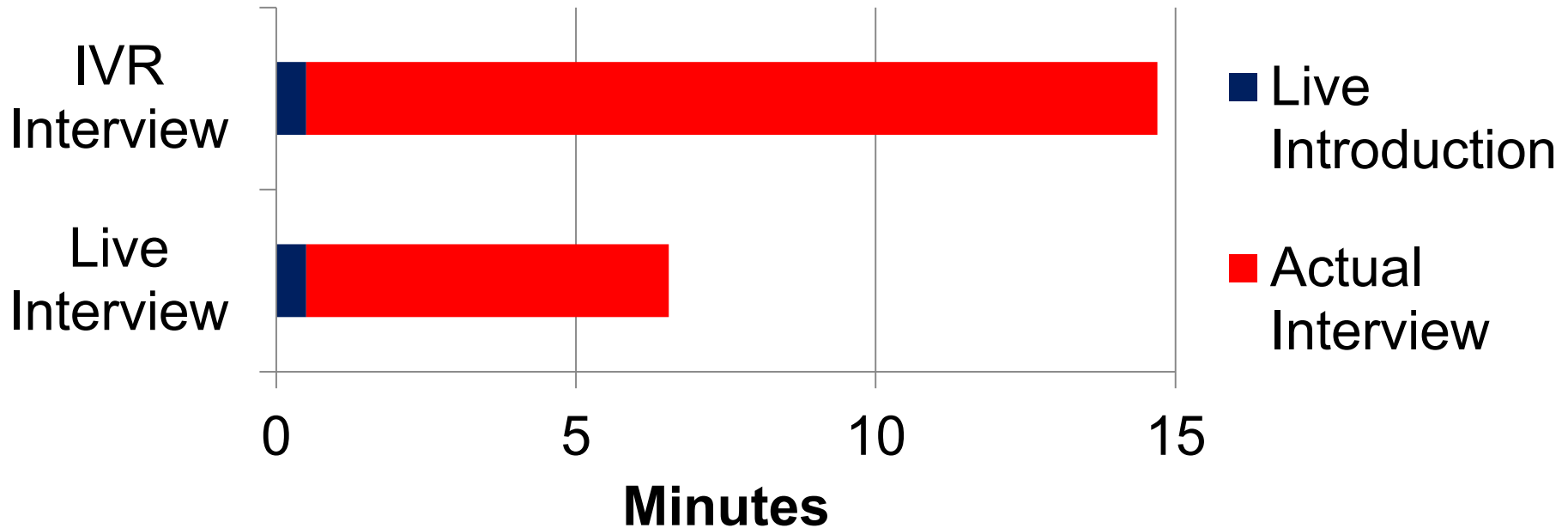


# Results: Source of Errors



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

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

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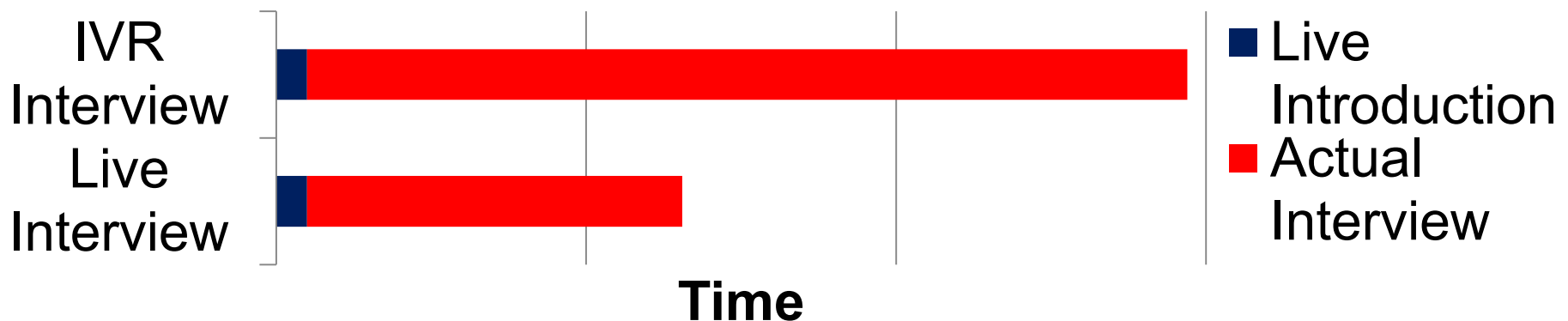
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\*Operator paid Rs. 8,000 / mo.; phone calls 60p / minute

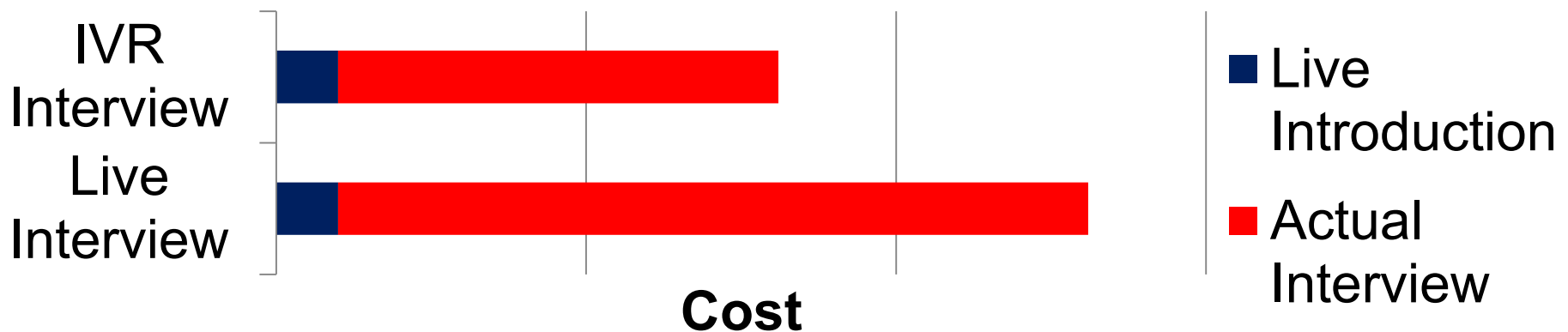
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# surveys (10 min each)	Interviewer + airtime savings by using IVR
1,000	\$200
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# Discussion

- 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