Extracting information from obstetricians' judgments using order-constrained models

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Background

- Obstetricians measure fetal heart rate during labor to evaluate the health of babies

- Using FIGO standards, babies can be classified as "normal", "suspicious", or "pathological"

- Reliability of classifications is low

- In previous research:
  - Simple hypotheses of agreement on nominal classifications reliability of classifications have been tested
  - Classifications have been treated as nominal

- By treating classifications as ordinal we can test more elaborate hypotheses

Current Project

- We propose the probability that a baby is healthy is expected to increase as the classification improves:

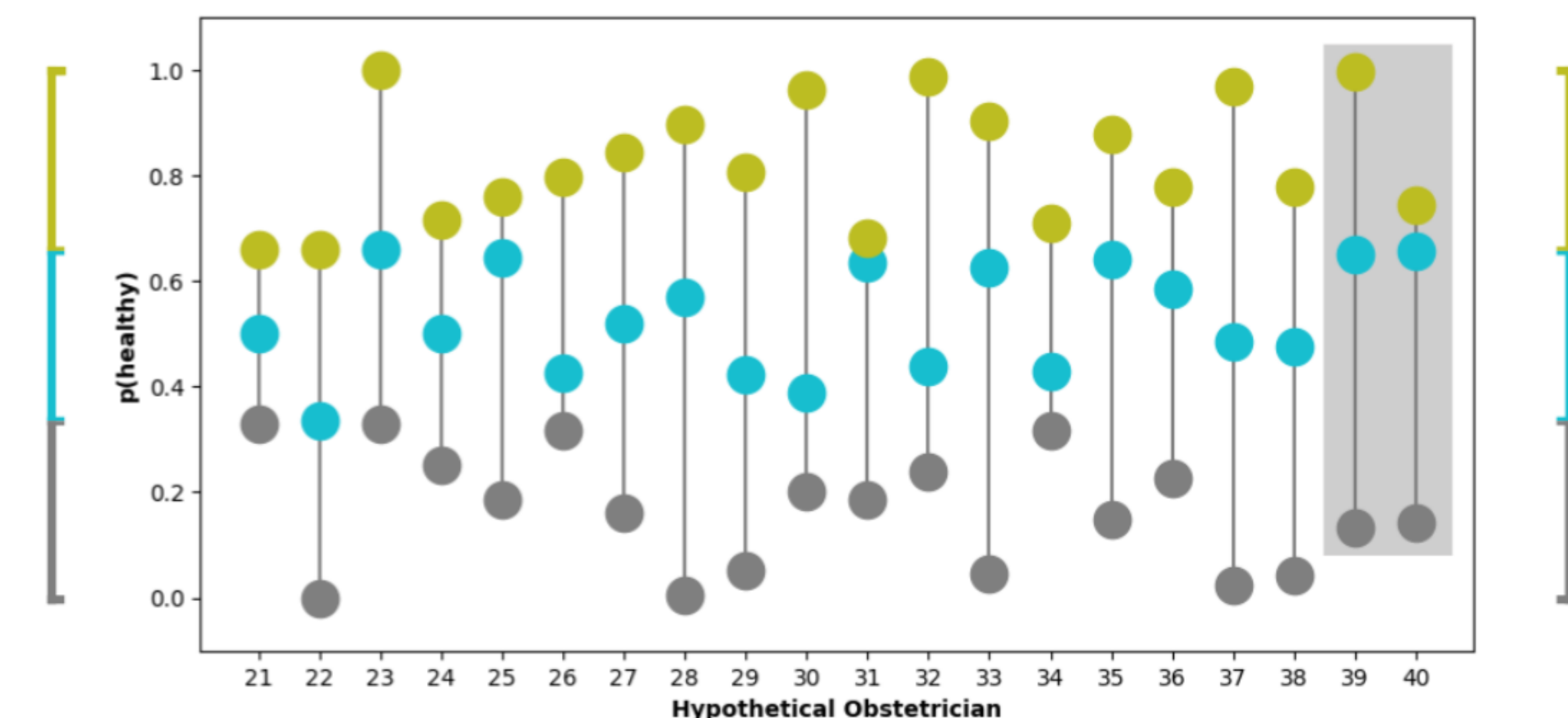**p(healthy|normal) > P(healthy|suspicious) > p(healthy|pathological)**

- We test different hypotheses about the ordinal patterns obstetricians' evaluations

- We use the CTU-CHB Intrapartum Cardiotocography Database, which contains baby health data, including CTG recording and evaluations by obstetricians
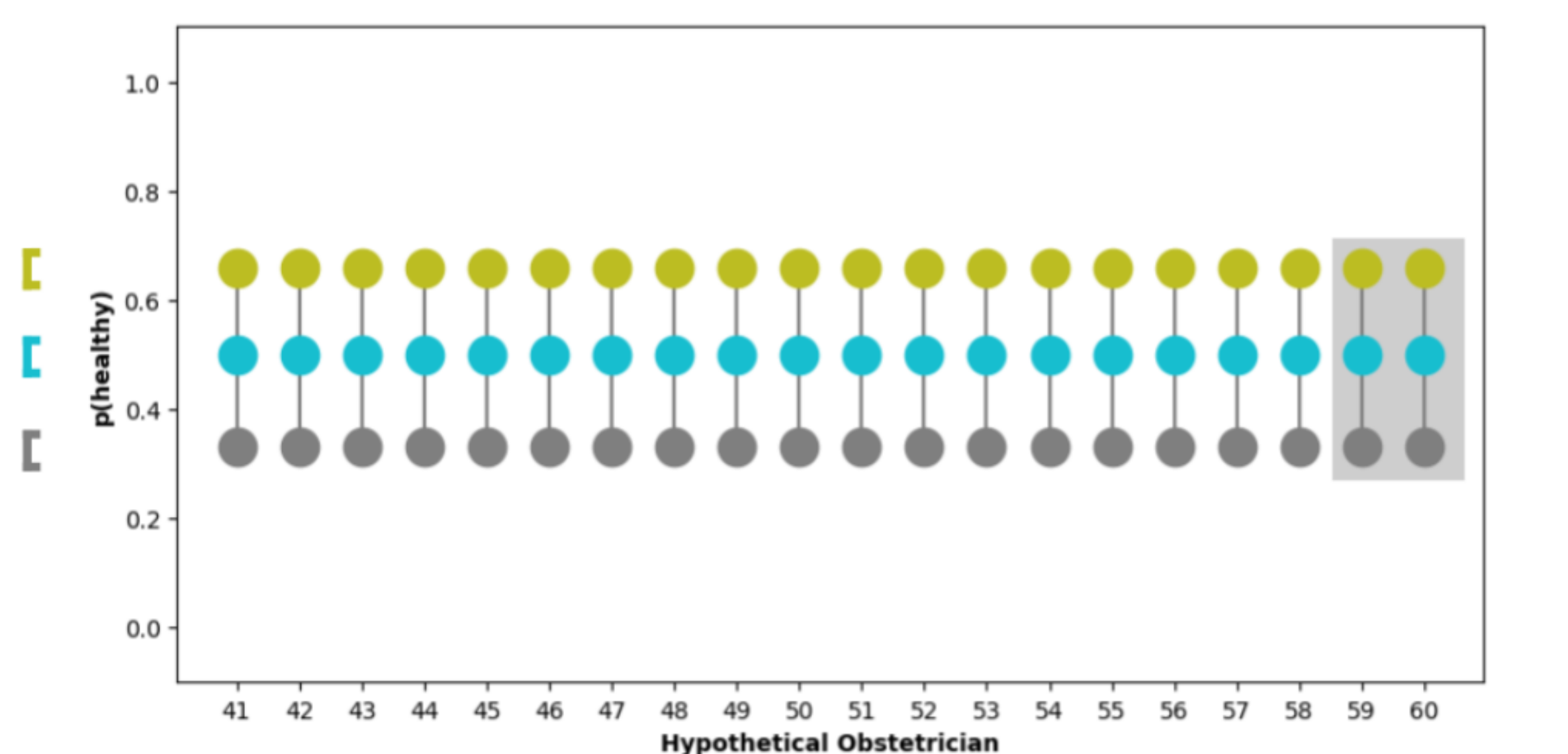
Hypotheses and Results

Hypothesis 1
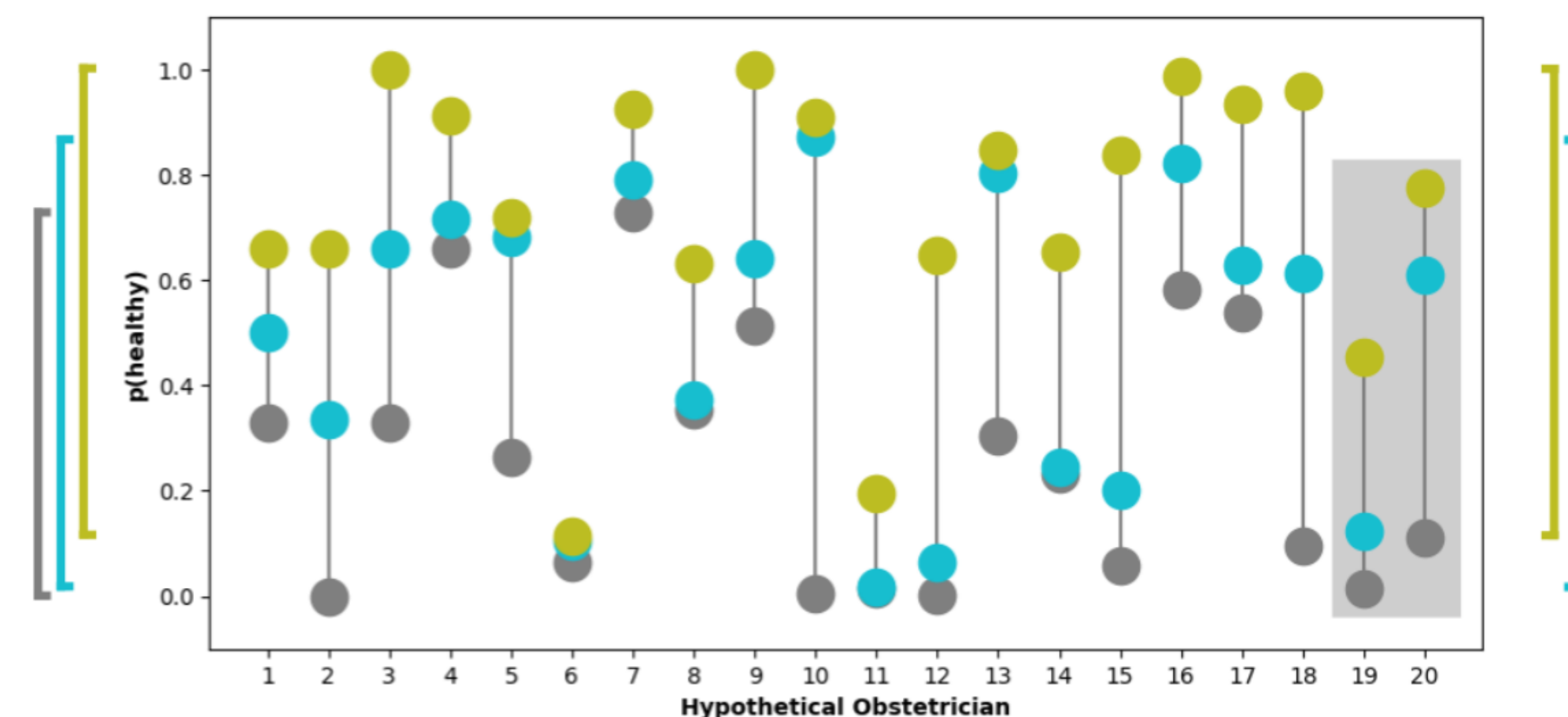
Hypothesis 2

Hypothesis 3

				Hypothesis 1	Hypothesis 2	Hypothesis 3
Obstetrician 1	Baby A	Pathological	...is less likely healthy than...	yes	yes	yes
	Baby B	Normal	...is more likely healthy than...	no	yes	yes
Obstetrician 2	Baby C	Suspicious	...is equally likely healthy as...	no	no	yes
Obstetrician 3	Baby D	Suspicious		✓	✓	✗

yes	Hypothesis does require constraint
no	Hypothesis does not require constraint
✓	Hypothesis confirmed
✗	Hypothesis rejected

Discussion

- The probability that a baby is healthy or unhealthy given an obstetrician's evaluation is comparable across obstetricians.

- Based on our findings, the probability of finding a healthy baby increases when obstetricians give a better evaluation.

- The obstetricians are not all equal but there seems to be consistency amongst clinicians' evaluations.

- Overall, the current study:
  - Suggests that the FIGO guidelines can be helpful and obstetrician's evaluations contain some information.
  - Highlights the need for action in order to achieve more comparable outcomes across obstetricians.

References

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