# The influence of AI advice on decision-making strategies in a hypothesis testing task.

"What effect does taking advice from a role-playing AI have on individuals performing DM tasks?"

"What different effects do the three advice roles have on the DM strategies and accuracy?"

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## Introduction

The project examines the influence of role-playing AI as an advice giver on individual decision-makers. Decision-making (DM) strategies and performance can be positively influenced by advice-providers (De Dreu and West, 2001; Nemeth, Brown and Rogers, 2001). In practice, human advisors do not execute their roles consistently or to full effect (Amason and Schweiger, 1994; Xiao, 2017). This has been attributed to the influence social conformity and conflict-avoidance behaviours (Cialdini and Goldstein, 2004). Progress in the capabilities of modern AI programs has resulted in programs that interact with human users. We will investigate how a role-playing AI influences individuals' DM strategies.

**Aims** :
1. Examine the effect of advice provision from three different roles on DM information search strategies.
2. Measure the effect of advice provision from three different roles on the task accuracy.

## Study Design

The study is a within-subject repeated measures design with 3 phases:
1. **Learning phase**
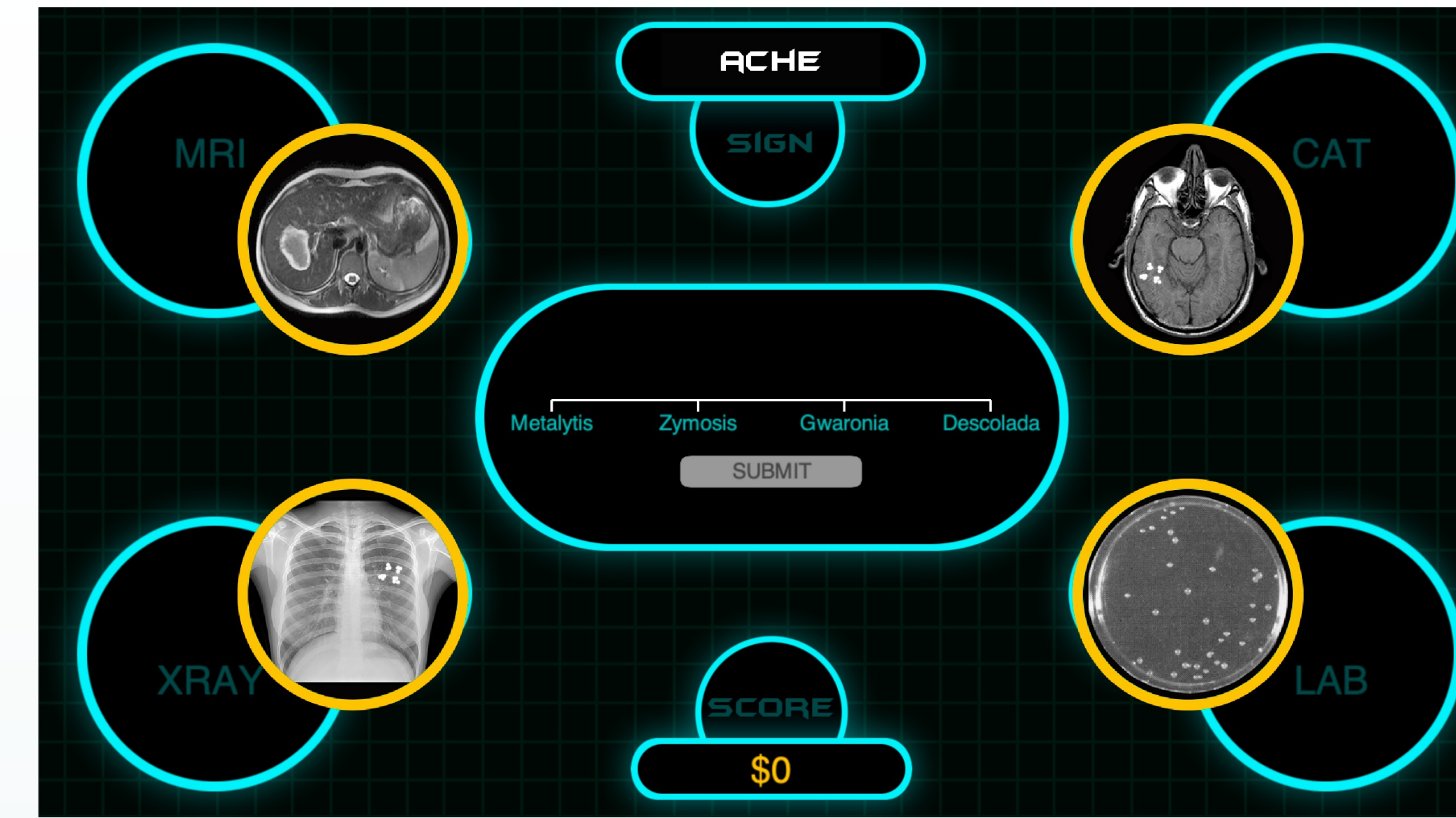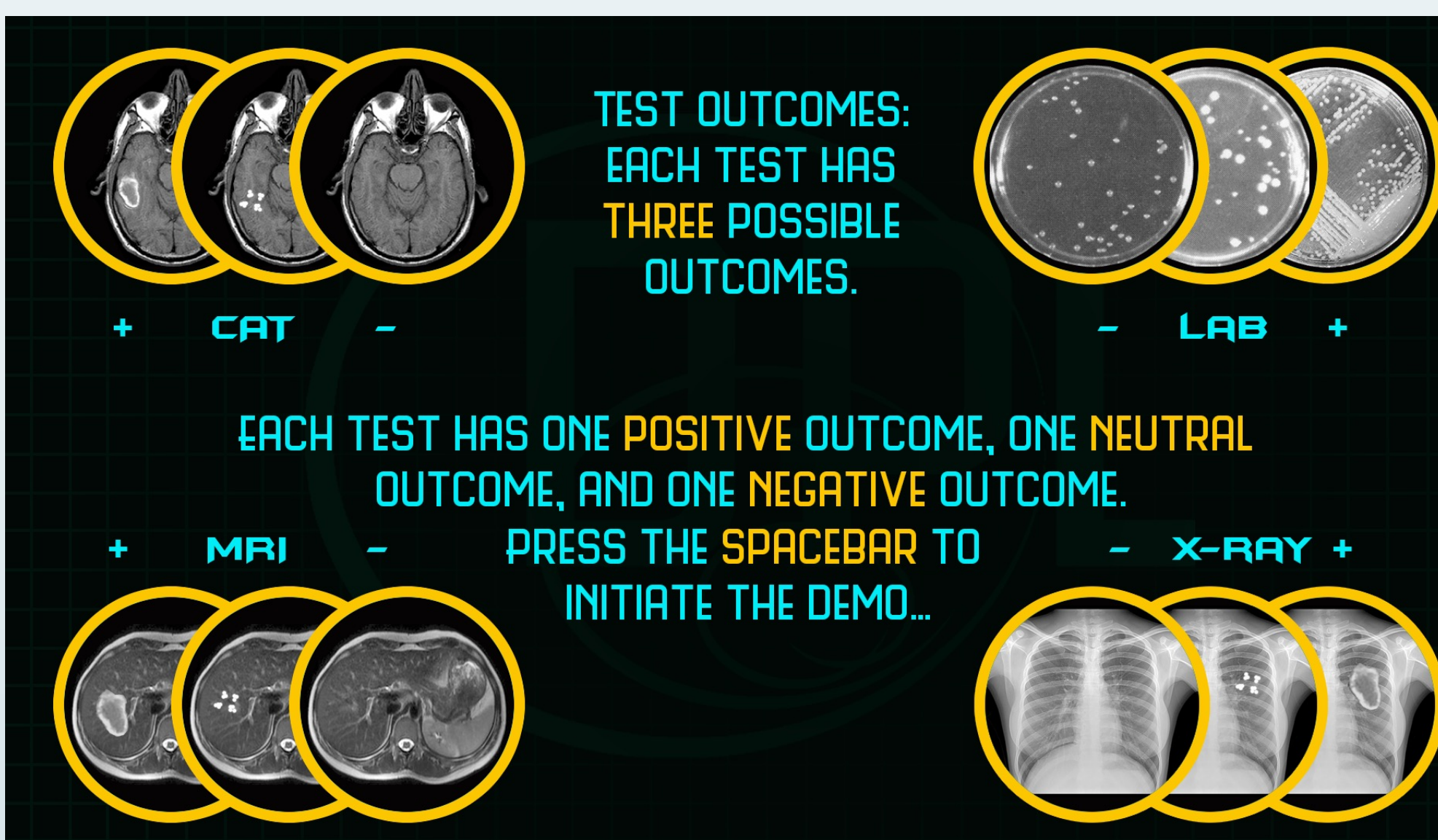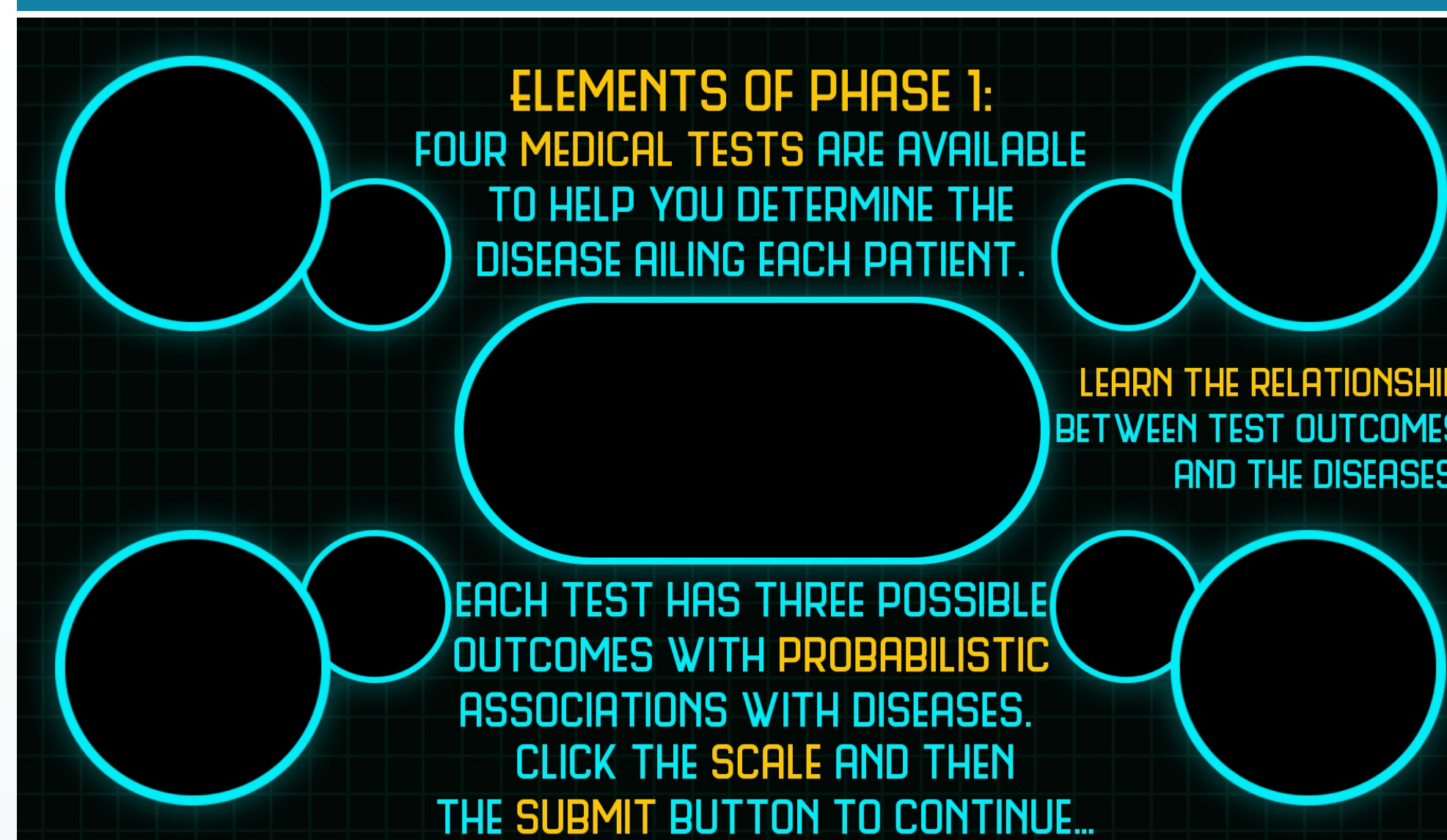2. **Test phase without advice.**
3. **Test phase with advice**.

In the third phase advice is provided in 3 different ways. Trials without advice will also remain in the third phase.

## Recruitment

Sample of convenience from UoB's Psychology Department. Power analysis n=55.

## The Task



ELEMENTS OF PHASE 1:
FOUR MEDICAL TESTS ARE AVAILABLE TO HELP YOU DETERMINE THE DISEASE AILING EACH PATIENT.

LEARN THE RELATIONSHIP BETWEEN TEST OUTCOMES AND THE DISEASES.

EACH TEST HAS THREE POSSIBLE OUTCOMES WITH PROBABILISTIC ASSOCIATIONS WITH DISEASES. CLICK THE SCALE AND THEN THE SUBMIT BUTTON TO CONTINUE…

PHASE 2:
THE PRESENTING SIGN WILL BE AVAILABLE TO START EACH TRIAL.

TEST RESULTS ONLY APPEAR AFTER YOU CLICK ON THE TEST.

YOUR TASK IS TO SELECT THE TESTS YOU NEED TO DIAGNOSE YOUR PATIENT. CLICK THE SCALE AND THEN THE SUBMIT BUTTON TO CONTINUE…

TEST OUTCOMES: EACH TEST HAS THREE POSSIBLE OUTCOMES.

EACH TEST HAS ONE POSITIVE OUTCOME, ONE NEUTRAL OUTCOME, AND ONE NEGATIVE OUTCOME.
PRESS THE SPACEBAR TO INITIATE THE DEMO…

+ CAT –    – LAB +
+ MRI –    – X-RAY +



## Advice Roles

The advice is presented after the symptom is shown.
**Devil's Advocate:** from most requested test, encourages a different test.
**The Moderator:** from least requested test, encourages a different test.
**The Facilitator:** from most requested test, encourages the same test.

## Protocol

1. **Learning phase**: 240 trials. Feedback on accuracy after each trial.
2. **Test phase**: Block 1: 60 trials without AI advice. Block 2: 80 trials with randomised advice (20 per role). 20 no-advice trials in randomisation.

```
DA_advice= f"When the patient has had a {symptom}, you have most frequently
requested {test}, consider requesting a different test this time"

FAC_advice = f"When the patient has had a {symptom}, you have most frequently
requested {test}, consider requesting this test again"

MOD_advice = f"When the patient has had a {symptom}, you have least frequently
requested {test}, consider requesting this test this time"
```

## Statistical Analysis

**Dependent Variables**: number of tests requested, distribution of requests per test, absolute accuracy of each individual.
**Test:** repeated measures ANOVA.
Main effect of no advice v advice.
3 contrasts for the different advice.

## Hypotheses

**H1**: For each presented symptom, participants will select tests in order of the tests' strength of diagnostic prediction.

**H2**: Advice from the Devil's Advocate role will result in individuals requesting a greater variety and greater number of tests across trials.

**H3**: Advice from the Moderator role will result in individuals requesting a greater variety and greater number of tests across trials.

**H4**: Advice from the Facilitator role will result in individuals requesting less variety and fewer tests across trials.

**H5**: Advice from the Devil's Advocate and Moderator roles will result in improved task accuracy.

**H6**: Advice from the Facilitator role will result in reduced task accuracy.

## Feasibility Study: Can generative AI be integrated into human DM teams' discussions to provide role-specific advice?

**Aim**: to assess whether AI advice can be contextually relevant and delivered as one of three pre-defined roles.

**Method**: tested a pilot and more basic version of a potential AI advisor program. Testing was performed on transcripts of a DM task using a UoB MSc dissertation. The task involved teams of 4 participants deciding which 1 of 3 candidates to recruit.
Program development had 3 phases:
1. Baseline program – python code.
2. Generative AI responses – OpenAI Text-Davinci-003.
3. AI roles – DA, MOD, FAC (see adjacent).

**Analysis**: Performance assessed with objective and subjective measures.
Objective: word count, candidate mentions, and when candidates were identified as the preferred option.
Subjective: manual review of the advice provided.

**Objective Results:** AI performed poorly, measured by mean absolute errors.
**Subjective Results:** AI provided contextually appropriate summaries of the transcripts.
AI correctly identified the selected candidate in 85% of the transcripts.
The advice provided met the requirements of the role in each instance.

**Conclusion**: although further program development is required for the future project, the study demonstrates the feasibility of a having role-playing AI advisor.

## References

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