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Using Virtual Reality to Study Adolescent Morality: A Pilot Study

Introduction

Background

- Motor vehicle (MV) accidents are the leading cause of death for 5-24 year-old's in the US [1].The unfortunate majority of these deaths are the consequences of driver decisions and behaviors (e.g., disregarding established legal and moral norms).
- These statistics indicate an imperative need for research into the moral decision-making processes of adolescents.
- Previously developed models of moral judgement-making have been unsuccessful in capturing the variability, stability, and flexibility involved in moral judgment making while also largely overlooking its developmental aspects [2]
- To overcome this, we have applied the newer, empirically backed intuition-based ADC (Agent-Deed-Consequence) model [3] from the field of neuroethics. This represents a variation in methodology towards understanding how these adolescents develop their moral judgements, specifically when faced with MV traffic dilemmas.

    its derived methodology uses vignettes designed in accordance with the model to capture these evaluations

Agent-Deed-Consequences Model of Moral Judgment

Utilizes three dominant moral theories to explain heuristic-like intuitive processes that inform moral judgments.
- **Agent [A+/A-]** - Aristotelian virtue ethics – *virtues versus vices.*
- **Deed [D+/D-]** - deontological ethics – *rule-based arguments for morality.*
- **Consequences [C+/C-]** - utilitarian ethics – *greater good arguments for morality.*

- Research also demonstrates that individuals tend to provide more realistic responses when situations are presented in immersive Virtual Reality (VR) with promising results towards its application of studying morality [5]

Focus of Study.

➢ Combining these methodologies (ADC model + VR), new research materials have been developed to operationalize a realistic moral traffic dilemma.

➢ In order to establish operational validity of these new materials for future use, we have conducted qualitative pre-testing on high school and undergraduate students with little to no training in ethics.
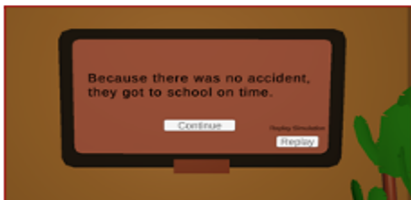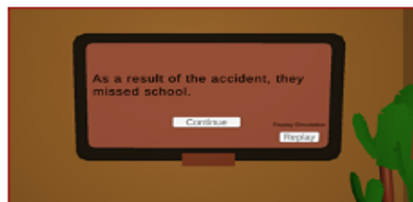
Research Materials

1. A textual vignette of a realistic traffic dilemma developed in accordance with the ADC model.
2. This vignette was then adapted and programmed into a VR simulation through Unity Real-Time Development Platform Version 2020.3.8

1. Textual Vignette:

A [**caring parent who tries their best to help their children excel [A+], negligent parent who is currently under the influence of illegal amphetamines [A-]**] driving their children to elementary school during morning rush hour traffic is approaching a busy intersection and sees the traffic light ahead turn yellow. As the parent presses on the brakes to slow down, but the car only reaches a complete stop after it has already crossed into the intersection, leaving the front end of the car sticking out towards oncoming traffic. The parent then makes a split-second decision to [**reverse the car back behind the line [D+], forcefully accelerate to try to pass through the intersection [D-]**] so as to not be hit by approaching vehicles. In the end [**there is a traffic accident and the children are late to school [C-], All is well and the children arrive with plenty of time to spare [C+]**].

2. VR Simulation:

	Positive [+]	Negative [-]
Agent	[A+]:Caring mother gladly helping her child	[A-]:Negligent mother who slaps child
Deed	[D+]:reverse the car back behind the line	[D-]: forcefully accelerate to try to pass through the intersection
Consequence	[C+]: No accident and child gets to school on time	[C-]: there is a traffic accident and the children are late to school

Methods

Qualitative Data Gathering: 6 combinations of the [+/-] ADC components VR simulations were uploaded as scenarios onto the Oculus Quest 2 Head Mounted Display (virtual reality headsets).
- A total of 33 high school (N=6) and undergraduate students (N=27) were recruited to participate in semi-structured interviews.
- Each student was presented one scenario at random and then asked:
    - A.) How realistic was the scenario?
    - B.) How morally acceptable was the scenario?

Statistical Analysis: Oculus VR data was imported into SAS for statistical analysis. Analysis of variance (ANOVA) testing was then conducted to test for an effect between six potential combinations of agent, deed, and consequence valences (e.g., A+D+C-, A+D-C+, A+D-C-, A-D+C+, A-D+C-, and A-D-C+.)

Figure: Oculus VR headsets were used to present the immersive scenarios
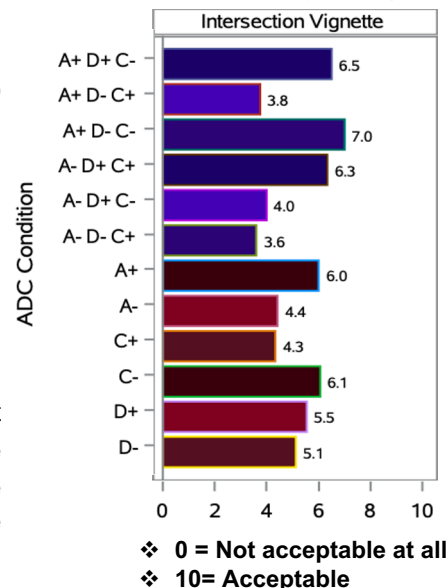
Results

Quantitative

- ANOVA results for the combined component valences (e.g., A+D+C-, A+D-C+, A+D-C-, A-D+C+, A-D+C-, and A-D-C+) were marginally significant ($F(5, 21)=2.11$, $p= .1047$).
- ANOVA results for the component valences (A+, A-, D+, D-, C+, C-) were statistically significant ($F(5, 90)=2.36$, $p=.0462$).

Qualitative

- The scenario was deemed to be an overall realistic situation that could be faced by drivers
- while positive and negative evaluations of the agent components were clearly discerned, there was some ambiguity and confusion regarding identification of the specific deed component along lapses in attributing the associated consequences

Mean Moral Acceptability Ratings

Intersection Vignette

ADC Condition	Rating
A+ D+ C-	6.5
A+ D- C+	3.8
A+ D- C-	7.0
A- D+ C+	6.3
A- D+ C-	4.0
A- D- C-	3.6
A+	6.0
A-	4.4
C+	4.3
C-	6.1
D+	5.5
D-	5.1

❖ 0 = Not acceptable at all
❖ 10= Acceptable

Discussion & Conclusions

ANOVA results indicated marginally and statistically significant findings but also demonstrated a significant amount of variance. In our on-going research, we have attempted to refine ambiguities in both the VR vignette and the morality prompts following observation of the video. In the qualitative analysis, participants also indicated that they were overstimulated by the VR and that a secondary viewing may have cleared up additional ambiguities. These findings have enabled us to refine our methodological approach and indicate that, while the results of this pilot were only marginally significant, that this pilot study is successful in giving us the opportunity to improve our design.

References
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