

Enhancing Moral Psychology Experiments with Task Gamification

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SCSP Conference

Outline

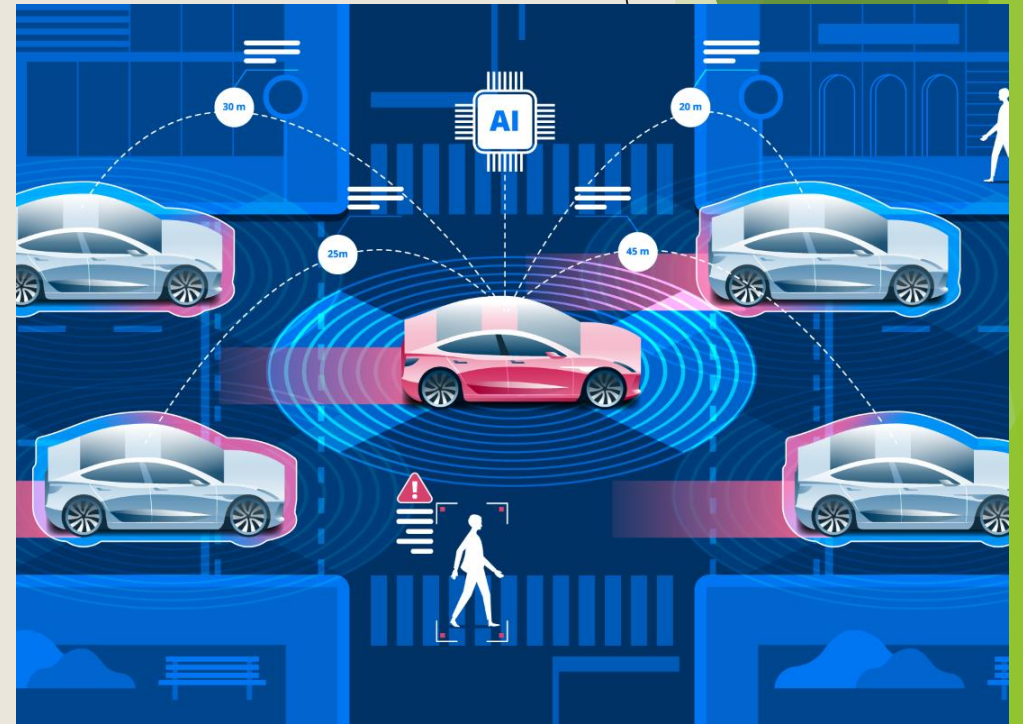
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- 1) Research Issues and Proposal
 - 2) Moral Psychology Methodologies and Their Limitations
 - 3) Rationale for Video Game-like Tasks
 - 4) Game Proposal and Data Collection Opportunity
 - 5) Discussion

The background features a light beige field with abstract green geometric shapes on the left and right sides. A thin white line runs diagonally from the bottom right towards the top right.

Research Issues and Proposal

Contemporary Importance

- ▶ Fully autonomous AI agents will have moral responsibility.
 - Autonomous vehicles
 - Care bots
 - Large Language Models
 - Weapons systems
- ▶ Thus, if they are to be given high levels of autonomy, then there should be a guiding set of moral principles.
- ▶ Moral psychology research can help understand human moral behavior to guide algorithmic development AI ethical settings that align with these human values.



Theoretical and Empirical Issues

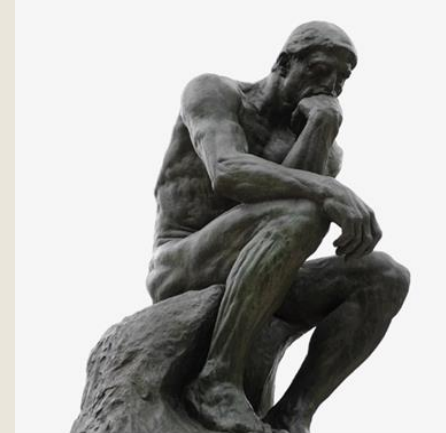
► Theoretical Issues

- Metaethical conflicts
 - Rationalism vs. Sentimentalism theories
- Normative framework contention
 - Deontology vs. Utilitarianism principles

► Empirical Issues

- Ecological Validity Concerns
 - Study results fail to be generalizable to behaviors in everyday life situations.
 - Possibly because stimuli lack realism/complexity of the real-world
- Logistical Short-comings
 - Small sample sizes
 - Biased sampling (regional/demographic)

Deliberation



Intuition



vs.

Norms



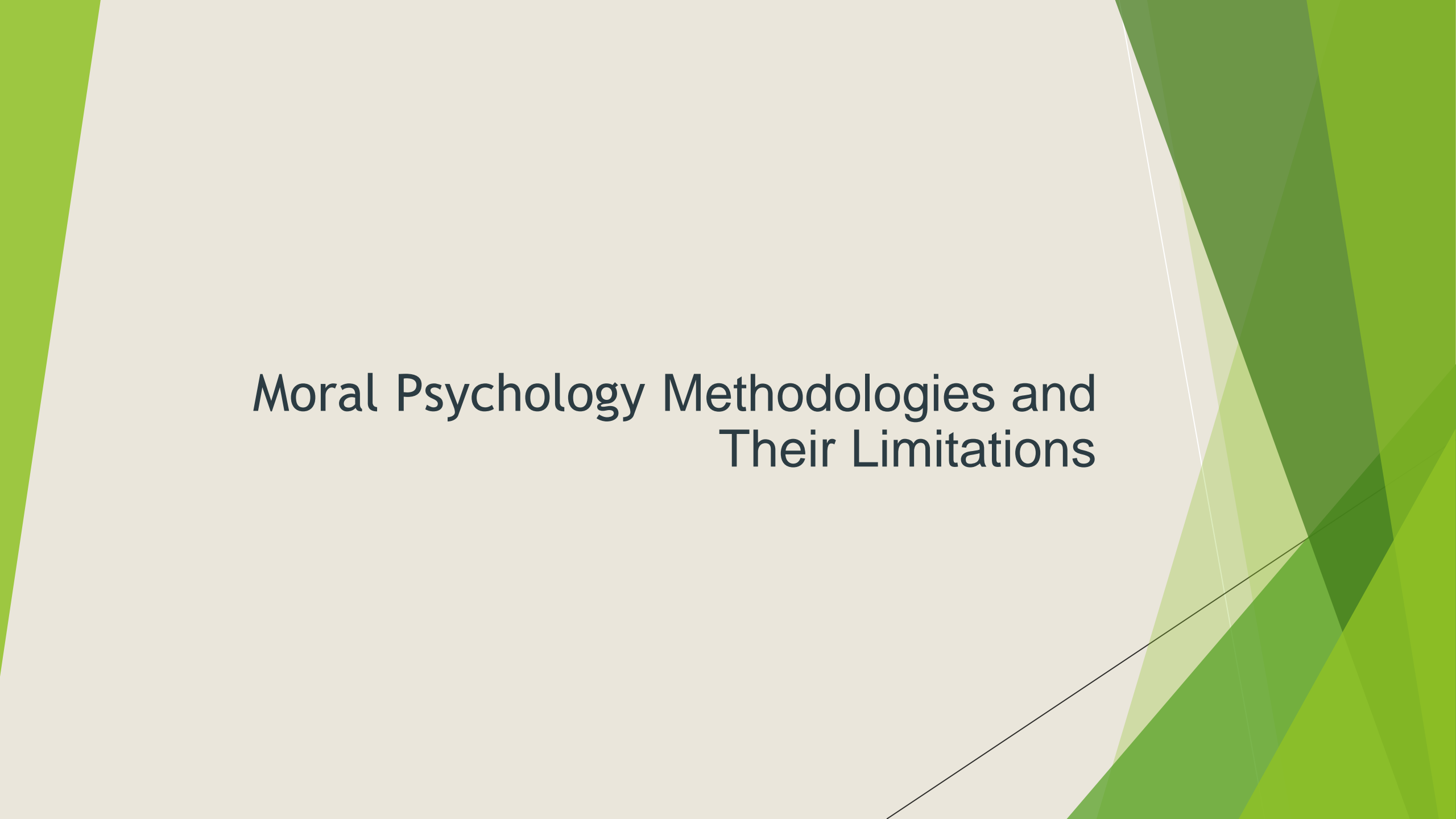
Outcomes



vs.

Video Game-like Experimental Tasks

- ▶ Solution: Integrate video game dynamics into moral psychology experiments
 - Make real-time, interactive decision-making experimental tasks
 - Should increase task realism and participant engagement
- ▶ Key Research Benefits
 - Greater ecological validity than traditional vignettes/surveys
 - Enables more informative investigations of metaethical and normative theories in dynamic contexts
- ▶ Leverages intrinsic human motivations
 - Gameplay is a critical part of what it means to be human
 - Well designed video games are highly immersive
- ▶ Provides novel data collection opportunities
 - Spacetime trajectories of moral actions and decisions
 - Geometric patterns linked to cognitive processes



Moral Psychology Methodologies and Their Limitations

Moral Psychology Methodologies

- ▶ Moral psychology research investigates the cognitive correlates of moral conduct using empirical methodologies.
- ▶ Commonly employed methodological stimuli:
 - Vignettes Studies - Short textual/visual moral dilemmas
 - Behavioral Experiments (e.g. Ultimatum Game) - Involving human competitors
 - Surveys and Questionnaires - Standardized question sets
- ▶ Occasionally paired with neurophysiological data collection strategies.



Harrison BJ, Pujol J, Soriano-Mas C, et al. Neural Correlates of Moral Sensitivity in Obsessive-Compulsive Disorder. *Arch Gen Psychiatry*. 2012

Metaethical Debate

- ▶ Rationalism: Morality is rooted in reason
 - Ethics of justice - progressive development of harm principles
 - Ethics of care - progressive development of help principles
- ▶ Sentimentalism: Morality stems from intuitive emotional reactions
 - Moral intuitions sometimes supersede reasoning processes
- ▶ Dual-process models propose integrations of both pathways

Dual process theory of thought



System 1

Fast / Automatic
Emotional

- Impulses / Drives
- Habits
- Beliefs



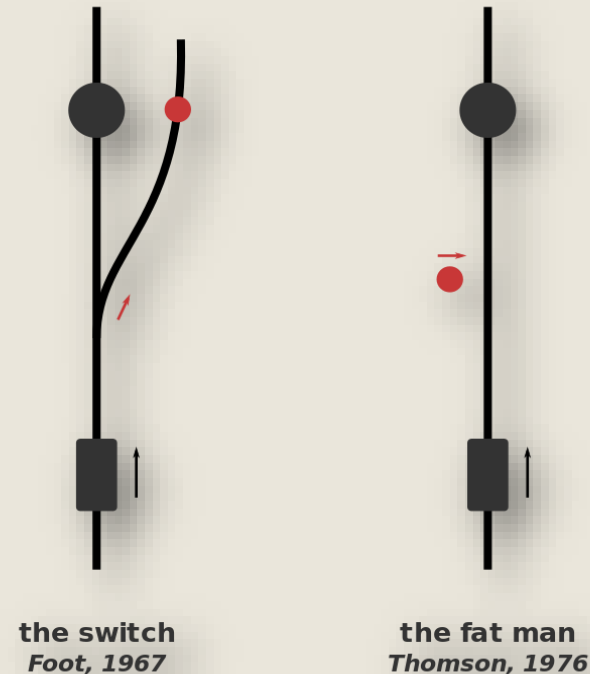
System 2

Slow / Effortful
Logical

- Reflection
- Planning
- Problem solving

Normative Framework Conflicts

- ▶ The switch
 - Flip switch to save five people
 - Inaction to conform with norms
 - Most people will flip the switch
- ▶ The footbridge
 - Push man onto bridge to save five people
 - Inaction to conform with norms
 - Most people will **not** push the man
- ▶ Are deontology and utilitarianism alone sufficiently explanatory of all morality?
- ▶ How do sufficiently explanatory theories interact?



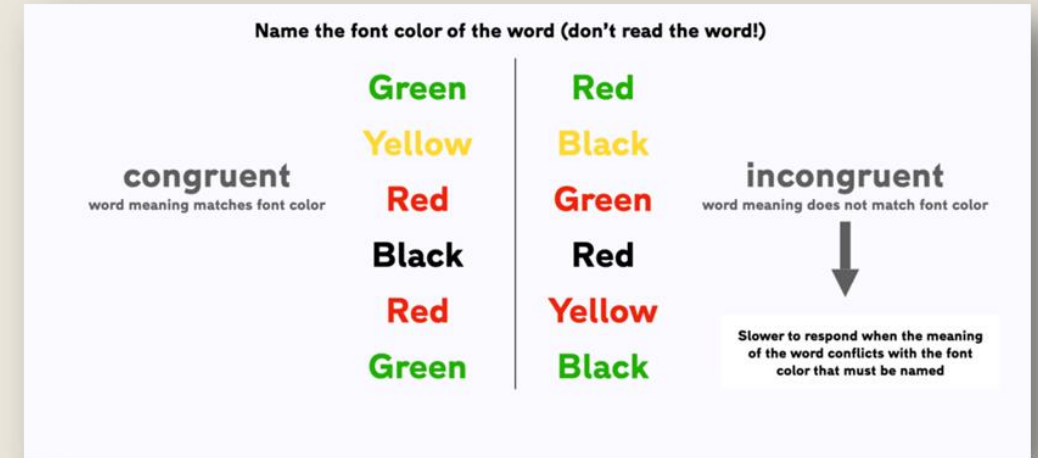
Low Ecological Validity

► Stimuli Lack Realism

- Psychological realism
 - Are similar brain regions active?
- Mundane realism
 - Does it look like the real world?
- Experimental realism
 - Does it feel like the real world?

► Most Research is Utilizes Construct-driven instead of Function-led tasks

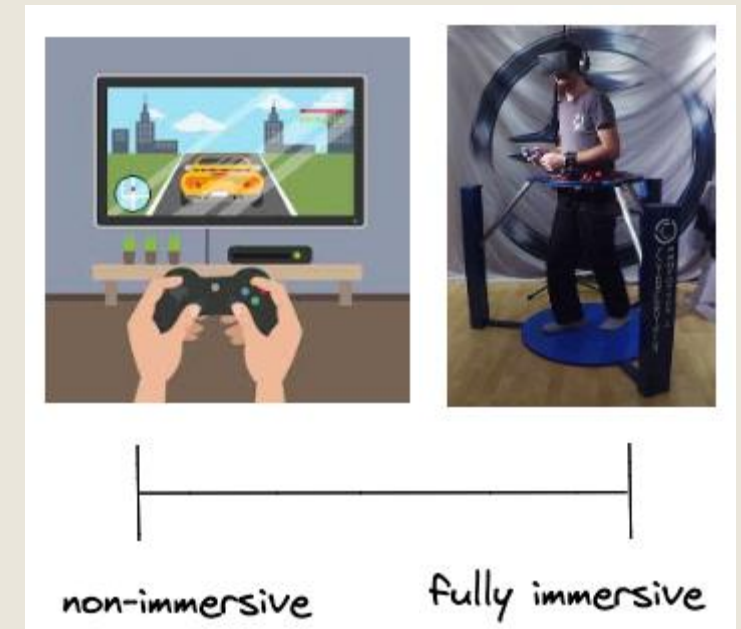
- Moral constructs, principles, and frameworks
- Open-ended realistic moral scenarios



Rationale for Video Game-like Tasks

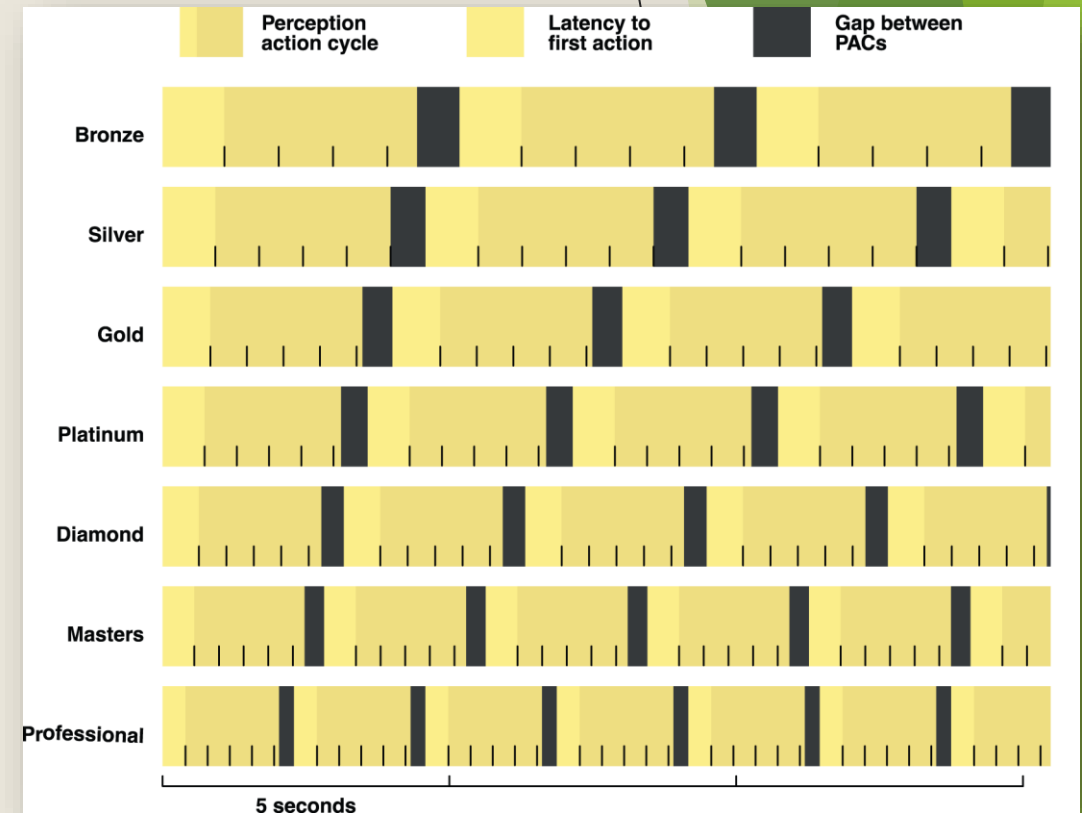
Video Games over Immersive Virtual Reality (IVR)?

- ▶ Premature Research literature consensus
 - IVR creates higher subjective presence
 - Highly interactive first-person shooter games report similar immersion levels between platforms
- ▶ Accessibility Advantages
 - No need for specialized/expensive VR hardware and setups
 - Video games can run on widely available computers/consoles
- ▶ Engagement Without Full Immersion
 - High engagement doesn't require physical VR immersion
 - Popular multiplayer/esports games demonstrate mental immersion



StarCraft II Study: A Model for Expertise Research

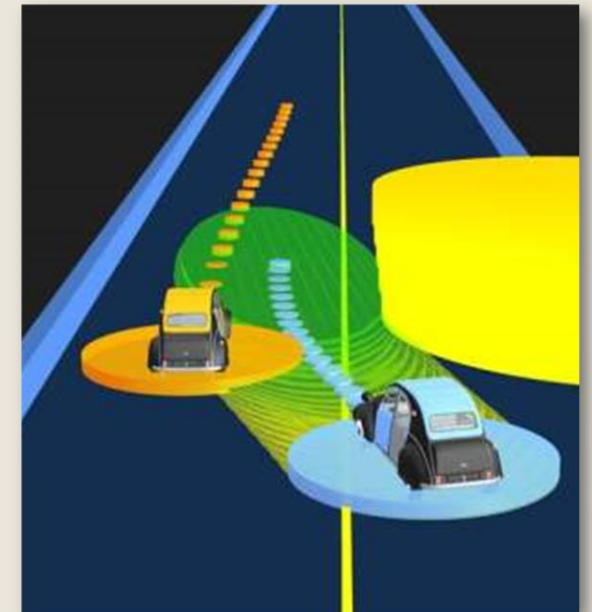
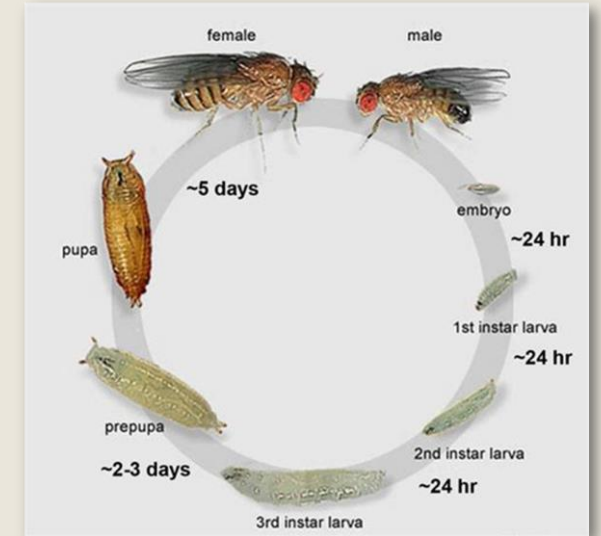
- ▶ Largest expertise study ever conducted
 - 3,360 players across 7 skill level (Bronze to Professional)
 - 77 countries (70% Euro-American and 95% Male)
- ▶ Measured precise, real-time cognitive-motor performance
 - ▶ Tracked actions, perception cycles, and attentional allocation
 - Provided direct, objective measures of domain expertise
- ▶ Rich, dynamic task environment with high participant motivation
 - Mirrors complexity of developing expertise in other domains
- ▶ Enabled multivariate analysis across expertise levels
 - Examined importance of numerous variables (perception, actions, hotkeys, etc.)
 - Allowed tracking how variable importance changes over skill development



Thompson JJ, Blair MR, Chen L, Henrey AJ. Video Game Telemetry as a Critical Tool in the Study of Complex Skill Learning. PLOS ONE. 2013.

RTS Games as a "Drosophila" for Cognitive Science

- ▶ Pivotal for genetic biology research due to:
 - Short life cycle allowing multi-generational studies - (Repeatability)
 - Easy to breed and maintain large populations - (Vast sample sizes)
 - Mutations and gene editing research - (Experimental Control)
 - Chemotaxis, phototaxis, and geotaxis - (Behaviorism)
- ▶ The RTS game platform offers similar advantages:
 - Identical starting states between and across participants - (Repeatability)
 - Feasibly can garner large, diverse populations - (Large sample sizes)
 - Manipulate key aspects of stimuli - (Experimental Control)
 - In-game strategies / Responses to human competitors - (Behaviorism)



Game Proposal and Data Collection Opportunity

Coast to Coast: A cross country road trip

► Game Overview

- Based on “The Long Drive,” an infinity randomly generated open-world driving game
- Driving simulator game with a predefined cross-country route
- Player must navigate common traffic scenarios (jams, construction, hazards etc.)
- Moral vignettes randomly triggered along the journey
 - Examples: Witnessing someone steal food, bystander situations, etc.

► Game Parameters

- Low-stakes scenarios generated more frequently than high-stakes one for enhanced realism
- Textual/visual and interactive vignettes developed for each scenario, assess differences between judgments and actions
- Moral dilemmas have downstream effects on the rest of the game
- Utilizes engaging game dynamics - realistic driving / challenging object manipulation tasks



Achieving Higher Ecological Validity

► Enhancing Mundane Realism

- Scenarios mimic common moral situations in everyday life
- Low-stakes dilemmas are more representative than extreme examples (footbridge)

► Varying Scenario Stakes

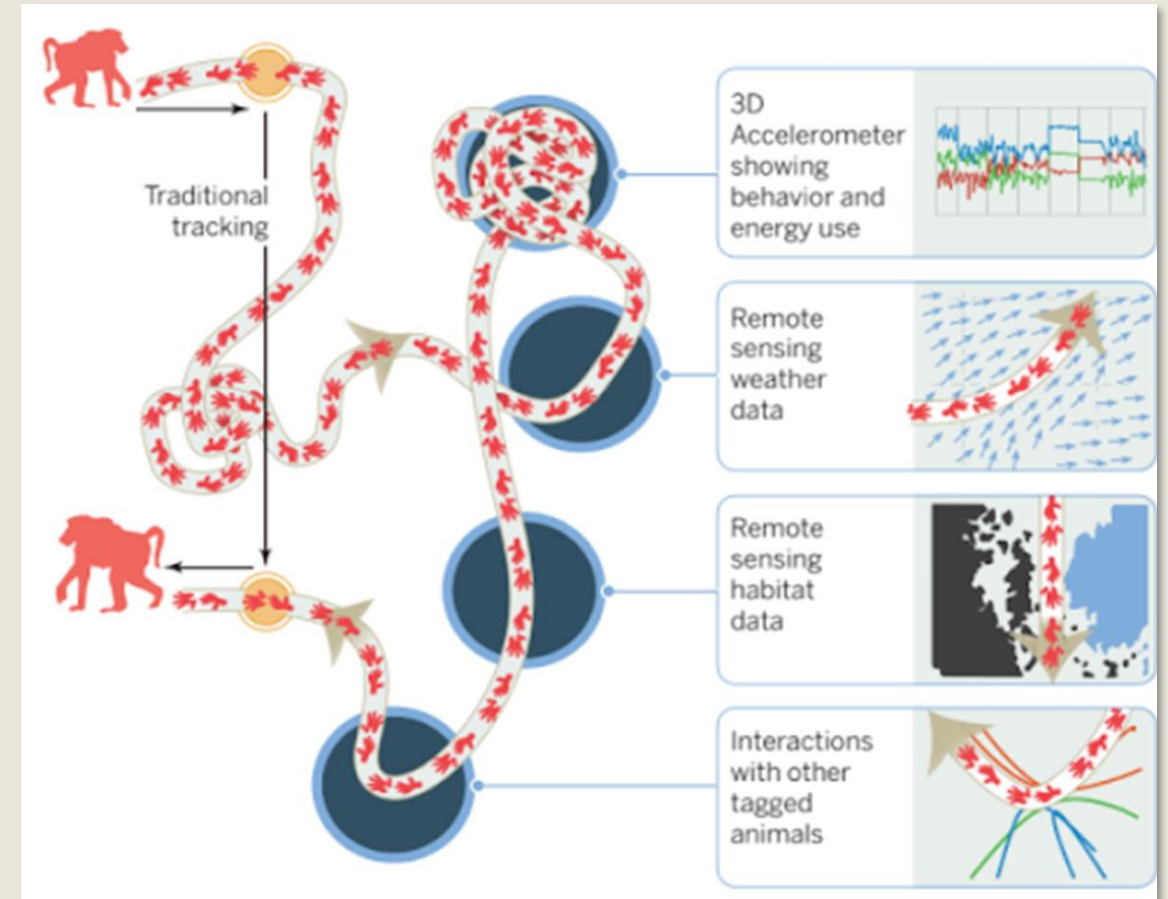
- Both low and high-stakes moral vignettes integrated
- Allows investigating different levels of moral intensity/saliency

► Functional Decision Paradigm

- Goes beyond abstract construct-driven moral probes
- Requires applying integrated moral faculties and frameworks in practical contexts
- Promotes generalizability to real-world moral performance

Geometric Analysis

- ▶ A participant's virtual-world lines is a data type similar to animal migration and navigation patterns
- ▶ Temporal isolation of events
- ▶ Exact environmental conditions and the corresponding reactions to the conditions
 - The moral decision-making wave around a funeral procession
- ▶ Records competitive and cooperative social interactions
- ▶ Turn action into high-resolution geometry



Roland Kays et al., Terrestrial animal tracking as an eye on life and planet. Science, (2015)



Limitations, Ethical Considerations, and Conclusion

Limitations

1. Sub-real ecological validity
2. Inaccurate representations of Non-Playable Characters (NPCs)
3. Strong emotions (compassion / disgust) may bias responses
4. Increased analysis complexity due to open-endedness of tasks
5. Likely learning curve and familiarity with gaming confounds
6. Technical issues and gaming glitches
7. Socio-cultural factors
8. Attrition Bias - A real cross-country road trip is 36 hours minimum

Ethical Concerns

1. Data handling - This methodology proposes collecting temporally aligned neurophysiological and geometric behavior patterns of moral events.
 - Maintain privacy by completely scrubbing identifying participant markers
 - Restrict using this methodology to beneficence research only
 - Storage, security, and future use
2. Informed consent - Due to the invasiveness and abstractness of this research a rigorously designed consent brief will be necessary.
3. Long-term effects - There is little to no research on the long-term effects of presenting highly stressful virtual stimuli to participants. (Active shooter, motorcycle crash)

Conclusion

- ▶ I think gamifying experiments is a step in the right direction.
- ▶ This shift increases the ecological validity of experiments by mirroring fundamental aspects of real-world scenarios missing in traditional paradigms.
 - High interactivity
 - Real-time nature
- ▶ The increased realism alongside the logistical superiority of this platform stands to provide a better playground for the metaethical and normative disputes.
- ▶ This methodology also facilitates the conversion of moral actions to geometric patterns, a strategy recognizing the importance of the journey, not just the destination.
- ▶ While limitations and ethical issues exist, this proposal to gamify experiments moves moral psychology research toward being more practically informative.

Thank you for your time.
Questions / Comments?

