Individual Differences in the Acceptance of Technology

Luke Symasek & Dr. Kristin Weger

Psychology Department

The University of Alabama in Huntsville

THE UNIVERSITY OF ALABAMA IN HUNTSVILLE

The Importance of Understanding Individual Differences

- Technology is growing at an incredible rate
- With that, the uses of technology are also growing
- Adoption of technology does not keep up with the growth of the technology, e.g., AI

Why?

There are many factors that contribute that vary from person to person

Individual Difference (ID)

An individual difference (ID) is any psychological trait that varies from person to person

- For Example: Age, Gender, Career, Personality, Education, etc. (Zhang et al, 2021; Korber & Bengler; 2014)

- Individual difference variables affect user acceptance and adoption (Agarwal & Prasad, 1999)

Acceptance and Adoption of Technology

Often used interchangeably

- Acceptance - An attitude towards technology that is influenced by factors such as perceived usefulness and perceived ease of use (Weger et al., 2022)

- Adoption - the actual use of the technology to its full capabilities (Weger et al., 2022)

Introduction to the Model

- Technology Acceptance Model (TAM) (Davis, 1989)
  - Two major factors: perceived usefulness (PU) and perceived ease of use (PEOU)
  - Other theories influenced the model such as Venkatesh's 2003 Unified Theory of Acceptance and Use of Technology (UTAUT) and Ajzen's 1991 Theory of Planned Behavior (TPB)
  - These theories all share a similar basic structure

- Most research in this domain sought to expand upon one of the above-mentioned theories (TAM was the most popular)

The Purpose of this Review

- This review was conducted in order to identify individual difference factors that may influence or be related to a person's likelihood of accepting a technology

- To inform the design and development of new AI adaptive technologies as it allows for a careful consideration of the user's differences in system design, services, and training.

Methodology

- Literature search with keywords ("Individual differences", "acceptance or adoption of tech", etc.)

- Mainly PsycINFO and Google scholar (later)

- Gathered 114 articles

- Searched for factors (i.e., themes, topics) representing IDs

- Organized articles by ID factor in text document

- Summarized each article with a short description of main findings and basis of research

14 Individual Difference (ID) Factors Identified

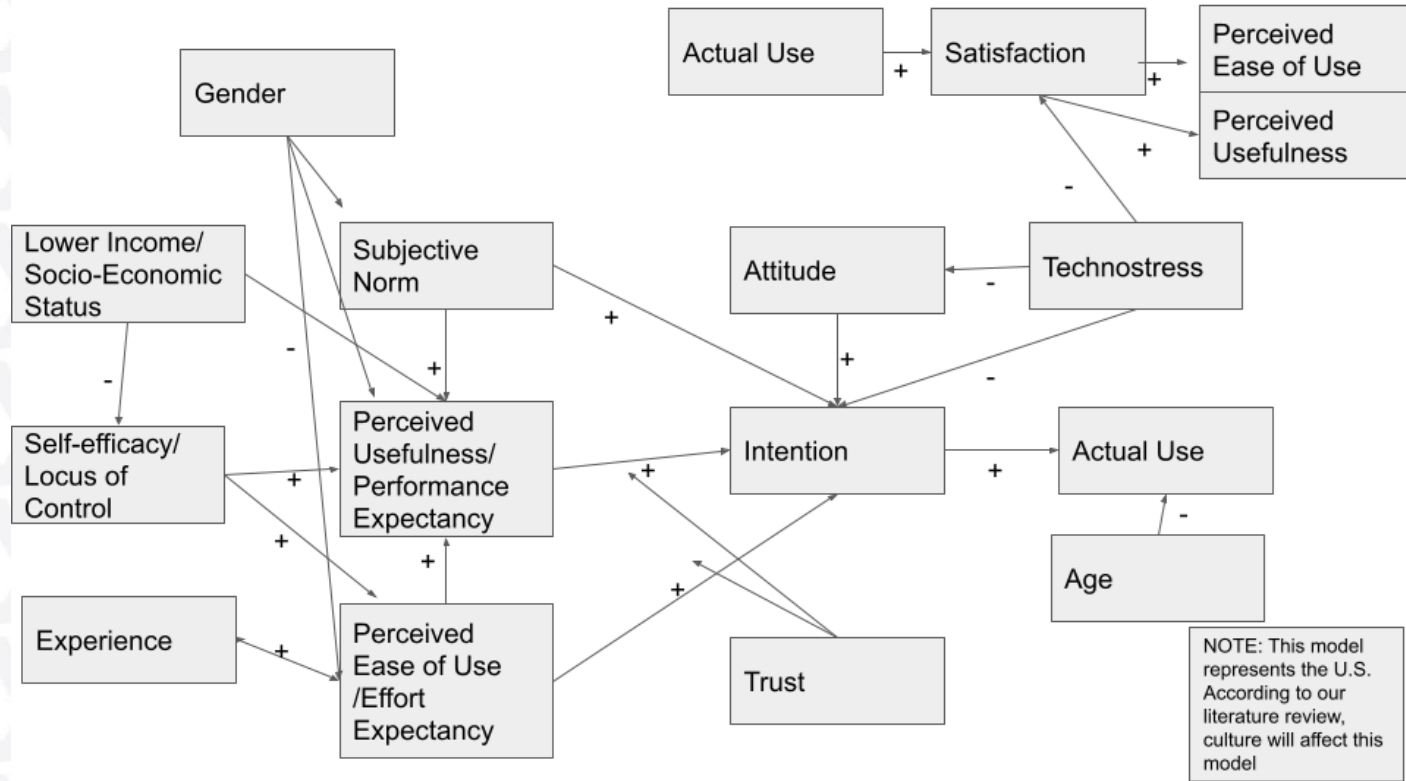|			
Gender	Learning/ Cognitive Style	Satisfaction	Self-efficacy
Age	Experience	Technostress	Culture
Personality	Attitude	Trust	Social influence/ Subjective norm
Income/ Socio-economic status	Miscellaneous		

Definitions of IDs

Individual Difference	Definition
Gender	The biological sex assigned at birth (Male/Female)
Age	The number of years it had been since someone was born. An increase in age meant an increase in that number of years.
Personality	Behavior and intrapersonal processes that originate within individuals and are consistent over time (Burger,2018)
Income/Socioeconomic status	This referred to the amount of money someone made.
Experience	The amount of previous exposure someone had to a technology.
Attitude	How someone reacts to something emotionally or how much they like it (affective component) and what someone believes about something (cognitive) (Yang and Yoo, 2004).
Satisfaction	The degree to which someone believes their needs are met using technology.

Definitions of IDs (continued)

Individual Difference	Definition
Technostress	The psychological and physical stress related to the use of technology (Joo, Lim, and Kim, 2016).
Trust	The willingness to be vulnerable with the expectation of achieving something in exchange (Wua, Zhaoa, Zhua, Tana, and Zheng, 2011).
Learning Style	The way in which someone prefers to learn something or most efficiently learns something.
Self-efficacy	One's own belief in their ability to carry out a certain behavior (Zhang, Han, Dang, Meng, Guo, and Lin, 2017).
Culture	Here, culture referred to the country in which the study took place.
Social Influence/ Subjective norm	The degree to which someone is influenced by their belief about what someone else would approve of them doing.
Miscellaneous	This does not refer to any particular ID, rather it refers to any other IDs found that only had one article associated with them.

THE UNIVERSITY OF
ALABAMA IN HUNTSVILLE

General IDs Model of Acceptance and Adoption

NOTE: This model represents the U.S. According to our literature review, culture will affect this model

Explaining the Model

- Subjective norm's (SN) effects on perceived usefulness (PU) and intention to use decreased as experience increased
- Higher self-efficacy was associated with higher PU and perceived ease of use (PEOU)
- Experience often positively influenced PEOU
- Lower SES/Income was related to lower self-efficacy and PU
- Gender:
  - Men often more affected by PU, while women more affected by SN and PEOU

Explaining the Model

- Satisfaction with tech positively influenced PEOU and PU, but also was influenced positively by actual use of technology and negatively by technostress
- Trust mediated positive relationship between PU and PEOU and intention to use
  - PU and PEOU positively influenced Trust > Trust positively influenced intention to use
- Often, the older someone was, the less likely they were to use tech, but it is not that simple
- Different cultures displayed different results, so this model is proposed only for the U.S.

Individual Difference (ID) Factors Identified

|			
Gender	Learning/ Cognitive Style	Satisfaction	Self-efficacy
Age	Experience	Technostress	Culture
Personality	Attitude	Trust	Social influence/ Subjective norm
Income/ Socio-economic status	Miscellaneous		

Personality, an ID that Influences Adoption

- Behavior and intrapersonal processes that originate within individuals and are consistent over time (Burger,2018)
- Big five personality traits
  - Openness to experience - degree to which someone is willing to take part in new experiences; trait is often associated with curiosity.
  - Conscientiousness - degree to which someone is responsible & organized
  - Extraversion - degree to which someone is sociable and outgoing. This trait is commonly associated with talkativeness.
  - Agreeableness - degree to which a person is nice and cooperative.
  - Neuroticism - degree to which a person is mentally unstable and unable to deal properly with negative emotions

- Neuroticism and Openness to Experience have been found to affect acceptance and adoption (Esterwood et al., 2021)
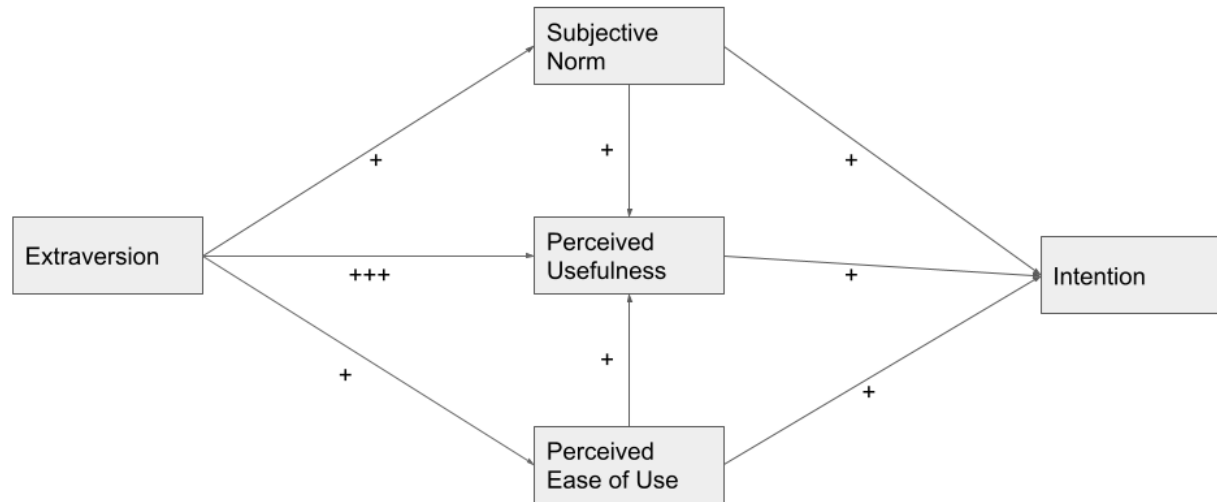- Models created were based on Davis' TAM (1989)
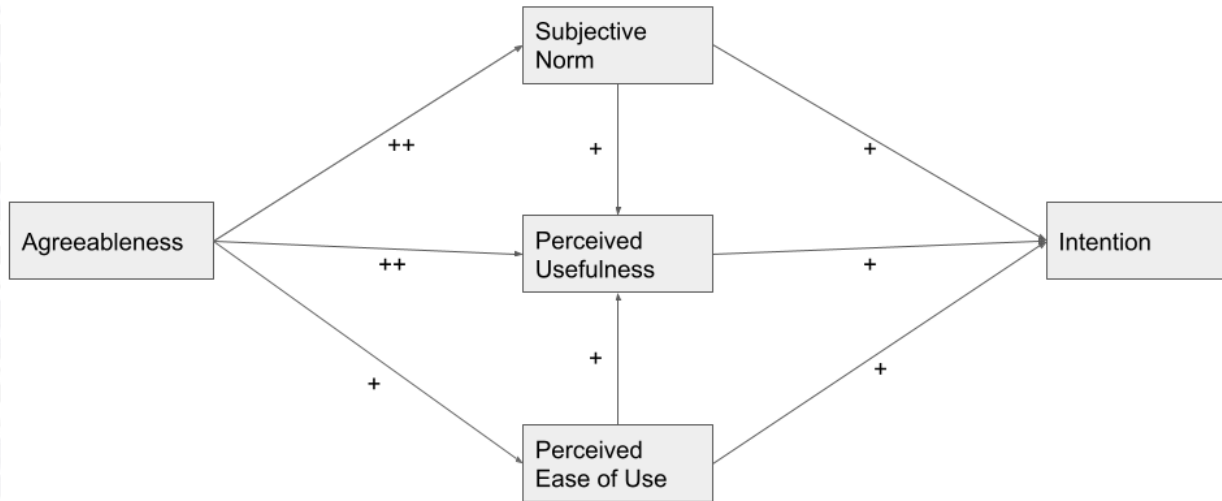
OCEAN - Openness
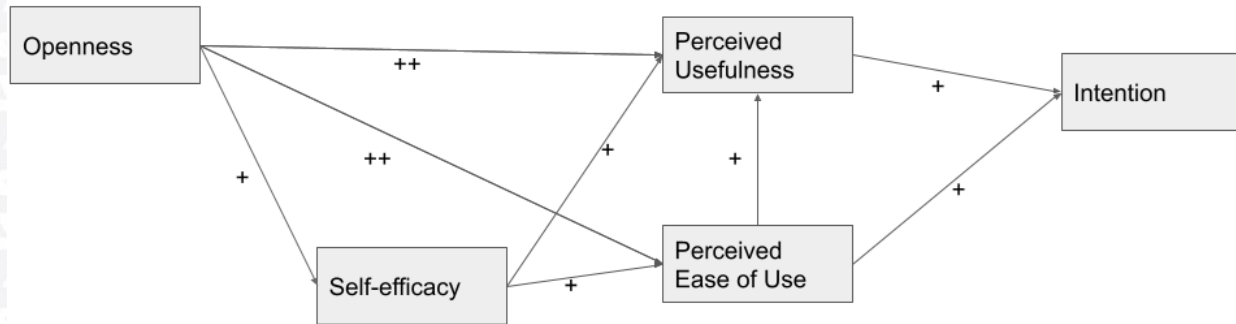
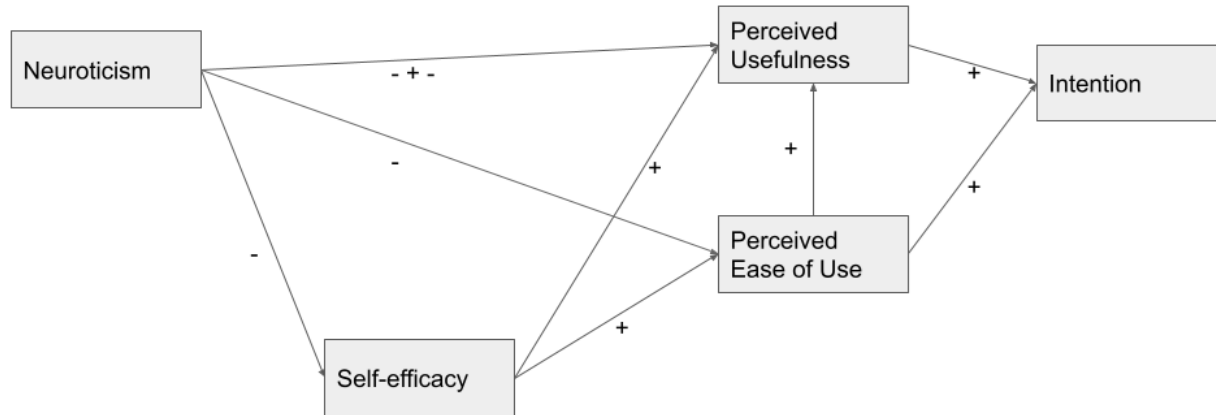# OCEAN - Conscientiousness
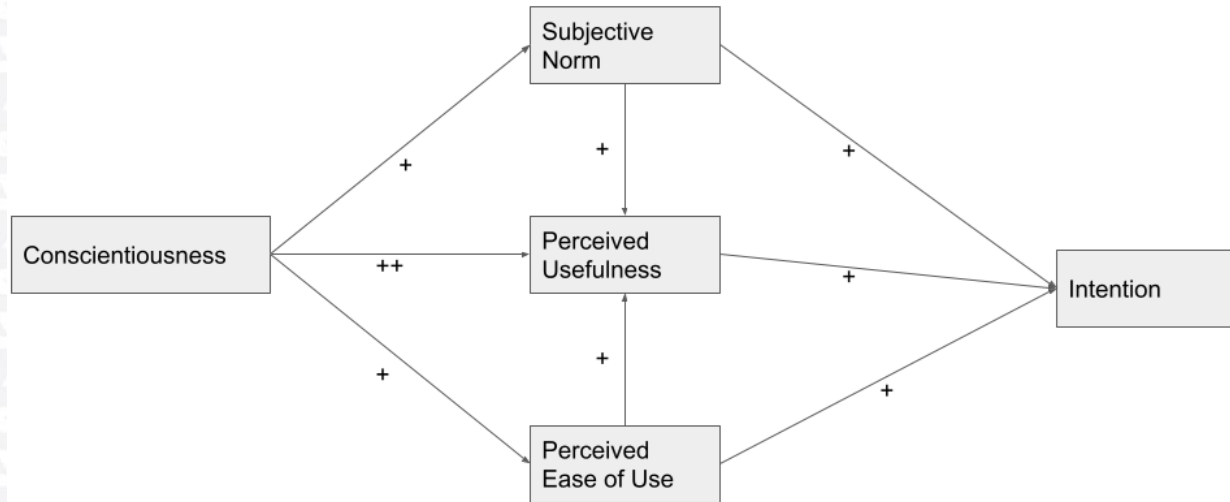
OCEAN - Extraversion

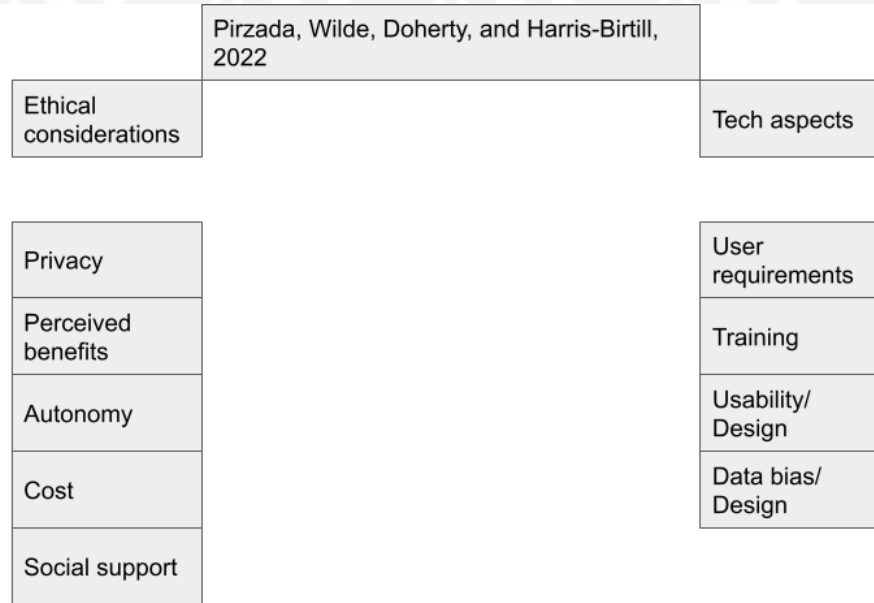# OCEAN - Agreeableness

OCEAN - Neuroticism

Explaining the OCEAN Models

- In review, 8 studies examined the Big Five
- Number of positive or negative symbols correspond to number of studies showing those results
- Almost every study found similar results with the traits' positive or negative relationships to the other variables
  - E.g. agreeableness was always found to have either positive relationships with the factors or no relationship, rather than a mix of negative and positive relationships
- Neuroticism showed mixed results in its relationship to PU (two negative, one positive
- This could be a subject for further research

Individual Difference (ID) Factors Identified

Gender	Learning/ Cognitive Style	Satisfaction	Self-efficacy
Age	Experience	Technostress	Culture
Personality	Attitude	Trust	Social influence/ Subjective norm
Income/ Socio-economic status	Miscellaneous		

Acceptance of Smart Home Tech Among Elderly

Pirzada, Wilde, Doherty, and Harris-Birtill, 2022	
Ethical considerations	Tech aspects

Privacy	User requirements
Perceived benefits	Training
Autonomy	Usability/ Design
Cost	Data bias/ Design
Social support	

Explaining the Acceptance Among Elderly Model

- Privacy - Among concerns about the nature of monitorization, older people wanted ability to control what data was given to whom (i.e. family members, healthcare providers, etc.)

- Perceived benefits - Benefits need to be clearly demonstrated before adoption

- Autonomy - Tech's ability to adapt to the person, rather than the person having to adapt to the tech

- Cost - The tech should be affordable

- Social support - Should not lead the person to only feel comfortable and safe inside their home, but should promote the person's ability to socialize

Ethical considerations

Privacy

Perceived benefits

Autonomy

Cost

Social support

THE UNIVERSITY OF ALABAMA IN HUNTSVILLE

Explaining the Acceptance Among Elderly Model

- User requirements - Tech should cater to the person's needs
- Training - Tech should be easy to learn
  - Elderly people were shown to not feel as if they are able to learn the tech
- Usability and design - The technology should be easy to use and operate. Several studies showed this was the most important aspect among the elderly people's acceptance and adoption
- Data bias/Design - Smart home tech is often developed using AI, so database should be representative of user base

Tech aspects

User requirements

Training

Usability/ Design

Data bias/ Design

Broader Implications from Pirzada et al.'s Study

- This study aimed specifically at smart home technology
- While the nature of the concerns may be different, the factors can be applied to other tech
- Further research should be done to examine specifics
- These factors may be something to keep in mind for those developing tech for older adults

Individual Difference (ID) Factors Identified

Gender	Learning/ Cognitive Style	Satisfaction	Self-efficacy
Age	Experience	Technostress	Culture
Personality	Attitude	Trust	Social influence/ Subjective norm
Income/ Socio-economic status	Miscellaneous		

Learning Styles

- Learning Styles - The way in which someone prefers to learn something or most efficiently learns said thing.

- Many studies did find support for learning styles having an effect on use

HOWEVER

- Need to be properly defined
  - Of seven studies reviewed, none defined learning styles the same way

- Future research should aim for a clearer definition

Discussion - What does this mean for systems design?

- There are many individual difference factors that affect acceptance and adoption

- Modelling these factors becomes complex

- In production of tech, the IDs need to be considered as early as possible

- Each circumstance needs to be examined separately

- Literature review with IDs in mind can lead to more effective production

Future research

- Study learning styles in a more consistent and clearly defined way
- How do these IDs factor into AI adaptive systems acceptance?
- Can the "Acceptance among elderly" be more broadly applied? (Do these aspects of acceptance apply outside of just smart homes?)
- Is the proposed model predictive of real-life behaviors?

Thank you!

Doctor of Philosophy
Applied Experimental Psychology

For more information on admissions, assistantships, and courses.

Contact LOB Lab
Lab Manager Taylor Yeazitzis
uahloblab@gmail.com

LOB LAB
Leadership and Organizational Behavior

THE UNIVERSITY OF ALABAMA IN HUNTSVILLE | DEPARTMENT OF PSYCHOLOGY

UAH.EDU/PSYCHOLOGY

References