National Training Aircraft Symposium (NTAS)   2017 - Training Pilots of the Future: Techniques & Technology

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What Factors Affect General Aviation Pilot Adoption of Electronic Flight Bags?

Troy E. Techau
Embry-Riddle Aeronautical University, techaut@my.erau.edu

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Agenda

- *Background of EFB Adoption*

- *Basics of Technology Acceptance*

- *Researching Acceptance of EFBs*

- *Implications for Flight Training*

EFBs – A Significant Capability

- EFBs = most categories and types of operation

- Support many functions (charts, weather, traffic, etc.)

- CPDLC and more to come

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Reproduced from https://outback.casa.gov.au/episode-10/electronic-flight-bags

EFBs – Not Adopted by All Pilots

- Ohme (2014) showed 21% of pilots chose not to use EFBs
- Lytle (2015) documented pilot comments on EFBs:
  - ✓ Likes:
    - o Improved functionality (zoom, highlight, night visibility)
    - o Consolidation of resources (all in one place)
    - o Improved efficiency (speed of access, updating)
  - ✓ Dislikes:
    - o Poor training ("trial and error" fielding approach)
    - o EFB limitations (processor speed, hardware issues)
    - o Regulatory limitations (capabilities available – not allowed)

Why Does Pilot Acceptance Vary?

- Is EFB adoption affected by:
  - ✓ ease of use?
  - ✓ availability of training?
  - ✓ cost factors?
  - ✓ expected utility?
  - ✓ social factors?

- Are there differences in pilot adoption of EFBs due to:
  - ✓ age?
  - ✓ gender?
  - ✓ tablet computer experience?

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Researching Technology Adoption

DOI
Diffusion of Innovations
Rogers (1962)

TRA
Theory of Reasoned Action
Fischbein & Ajzen (1975)

TAM
Technology Acceptance Model
Davis (1986)

TPB
Theory of Planned Behavior
Ajzen (1991)

UTAUT
Unified Theory of Acceptance and Use of Technology
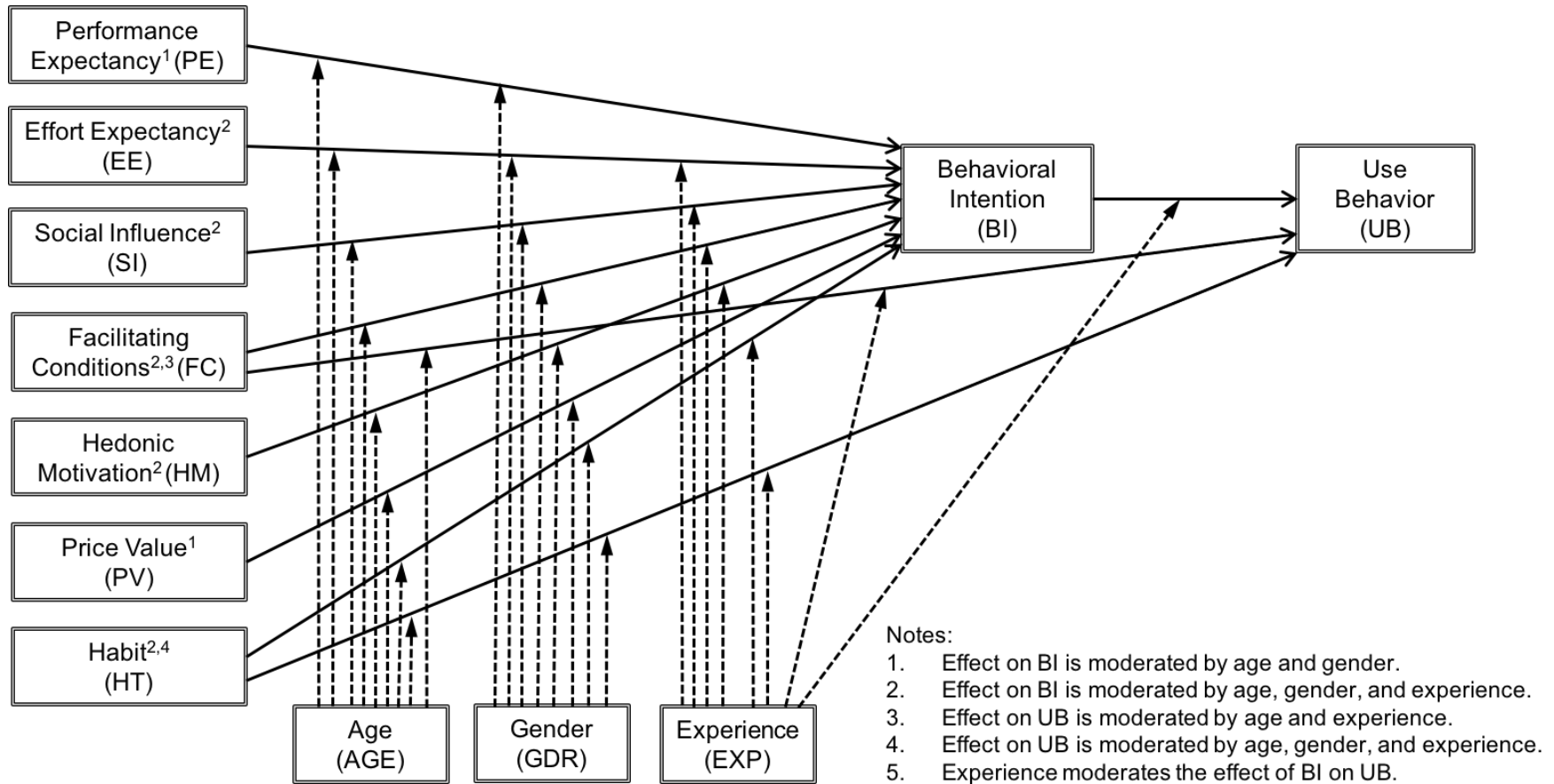Venkatesh, Morris, Davis, & Davis (2003)

UTAUT2 = Consumer Oriented UTAUT

- Unified Theory of Acceptance and Use of Technology (UTAUT2) (Venkatesh, Thong, & Xu, 2012)

- Exogenous Factors

  ✓ *Performance Expectancy -* does the system help me perform?

  ✓ *Effort Expectancy –* how easy is it to use the system?

  ✓ *Social Influence –* do others think I should use the system?

  ✓ *Facilitating Conditions –* is there a system support infrastructure?

  ✓ *Hedonic Motivation –* is the system fun to use?

  ✓ *Price Value –* is the system worth the cost?

  ✓ *Habit –* do I use the system as automatically based on learning?

Behavioral Factors and Moderators

- Behavioral Factors
  - ✓ *Behavioral Intention*
  - ✓ Actual *Use Behavior*

- Moderators:
  - ✓ Age
  - ✓ Gender
  - ✓ Experience (with the target technology system)

Notes:
1. Effect on BI is moderated by age and gender.
2. Effect on BI is moderated by age, gender, and experience.
3. Effect on UB is moderated by age and experience.
4. Effect on UB is moderated by age, gender, and experience.
5. Experience moderates the effect of BI on UB.

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Research Design

- Quantitative non-experimental research design:
  - ✓ survey data collection
  - ✓ structural equation modeling (SEM) analysis

- UTAUT2 survey instrument adapted for EFBs

- Focus on general aviation (GA) pilots
  - ✓ researcher interest
  - ✓ most closely represent consumer-oriented decision-making regarding EFB at the individual level

UTAUT2 Results – Other Technologies

Author	Technology Studied	Year	Significant Correlation to BI or UB Observed							Moderating Effect Observed		
			PE	EE	SI	FC	HM	PV	HT	Age	Gender	Experience
Devine	Nurse Use of Social Media	2015	X	X	X	X	X	X	X	X		X
Bryant	Graduate Student Academic Use of Multi-modal Tablets	2016	X	X	X	X	X	X	X		X	X
Koman	Baby Boomer Acceptance and Use of Mobile Device Cyber-Security	2016	X	X	X	X	X	X	X		N/A	N/A
Francis	Physician Acceptance of Data from Patient Self-Monitoring Devices	2016	X		X		X	X		X		X
Salinas Segura	Google Glass as a Pervasive Information System (PIS) (*modified)	2015	X	X	X		X	X	N/A	N/A	N/A	N/A

- Support for a given factor could influence training design:
  - ✓ A strong correlation (+ or -)

    = factor may influence *behavioral intention* or *use behavior*
  - ✓ No or minimal correlation

    = factor unlikely to influence behavioral intention and use behavior
- Example:
  - ✓ If *facilitating conditions* is supported as a factor:

    - trainers might ensure user support for EFBs is readily available (classes, manuals, online tutorials, etc...)

- If age, gender, or experience are supported as moderators:
  - ✓ The moderator influences the relationship between a factor and *behavioral intention* or *use behavior*

- Examples:
  - ✓ If *age* moderates the relationship of *effort expectancy* on *behavioral intention:*

    - trainers might consider a student's age as relevant to how instructional material is presented

  - ✓ If *experience* moderates the relationship of *effort expectancy* on *behavioral intention:*

    - trainers might seek to increase exposure to tablet technology

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EMBRY-RIDDLE
Aeronautical University

Questions?

For more information:
Troy E. Techau
techaut@my.erau.edu
(813) 766-2056