Towards incorporating personality into the design of an interface: A method for facilitating users' interaction with the display

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CONTENTS

1 Introduction

Human-Computer Interaction (HCI)

- Shift from conventional design to understanding and assessing user experience design based on certain psychological features (De Oliveira et al., 2012)

- Limitation in personalizing the design of UI is one of the main barriers that prevent users from using technology effectively

- Personality and cognitive abilities influence how an individual perceive the design to be efficient
(Viveros et al., 2014)

2 Study Rational

Graphical user interface (GUI)

Studying the relationship between individuals' mental model and their experience using a design will help toward building a better UI.

- Mental Model: someone's thought process about how something works in the real world.
  - High cognitive load
  - Attention

- Studied the role of personality characteristics in the design of an interface in a mobile learning context

3 Method

Participants

- 87 undergraduate students
  - 37 male & 50 female
  - 50 Neuroticism & 37 extra-conscientiousness
- Corrected-to-normal vision.
- Age = 18 ~ 23 yrs old
  - Mean = 20.13
  - SD = 1.71

4 Design Stage
Overview

4 Design Stage

Assessment of personality characteristics

IPIP-NEO	International Personality Item Pool Representation of the NEO PI-R
	Used to assess the subjects personality
Big-Five Personality traits	OCEAN
	Openness – Conscientiousness – Extraversion – Agreeableness – Neuroticism

4 Design Stage

Assessment of design preferences

First Section

Multi-scale questions design elements

- Structure, navigation, layout, font style attributes, font size, button, color, list, information density, support, and alignment

Second Section

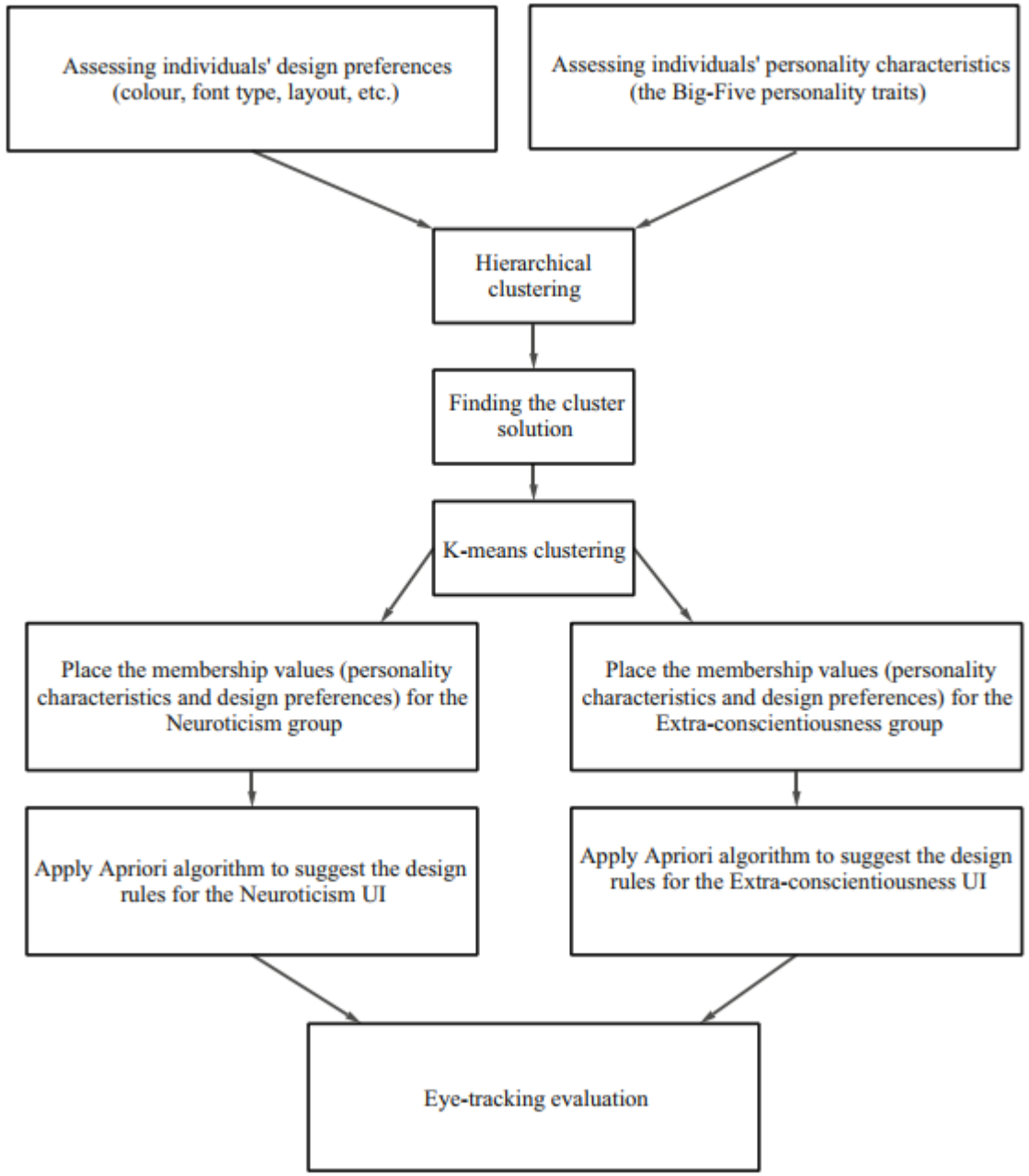
Open-ended equations related to design principles

- quantity, clarity, simplicity, and affordance of general design

4 Design Stage

Hierarchical, K-means clustering & Apriori algorithm

Hierarchical clustering	A technique that produces a set of hierarchical decompositions to identify groupings among population of individuals
K-means clustering	Arranges the supplied objects into k partitions that can be used later to shape the membership based on the similarity and dissimilarity of features in each cluster
Apriori algorithm	Helps discover potential relations between different instances that fall within specified distance categories


Assessing individuals' design preferences (colour, font type, layout, etc.)
Assessing individuals' personality characteristics (the Big-Five personality traits)
Hierarchical clustering
Finding the cluster solution
K-means clustering
Place the membership values (personality characteristics and design preferences) for the Neuroticism group
Place the membership values (personality characteristics and design preferences) for the Extra-conscientiousness group
Apply Apriori algorithm to suggest the design rules for the Neuroticism UI
Apply Apriori algorithm to suggest the design rules for the Extra-conscientiousness UI
Eye-tracking evaluation

4 Design Stage

Two clusters

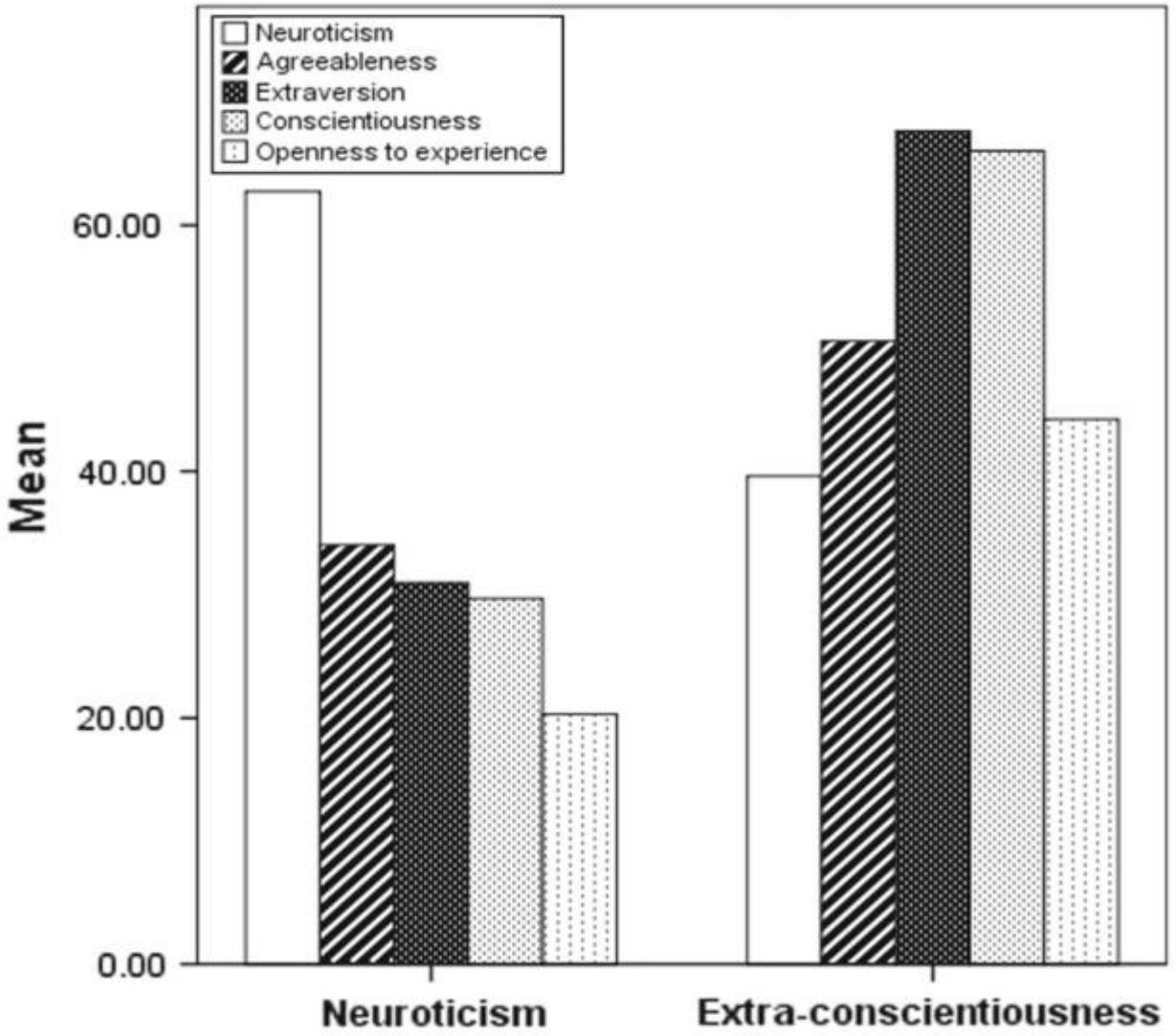
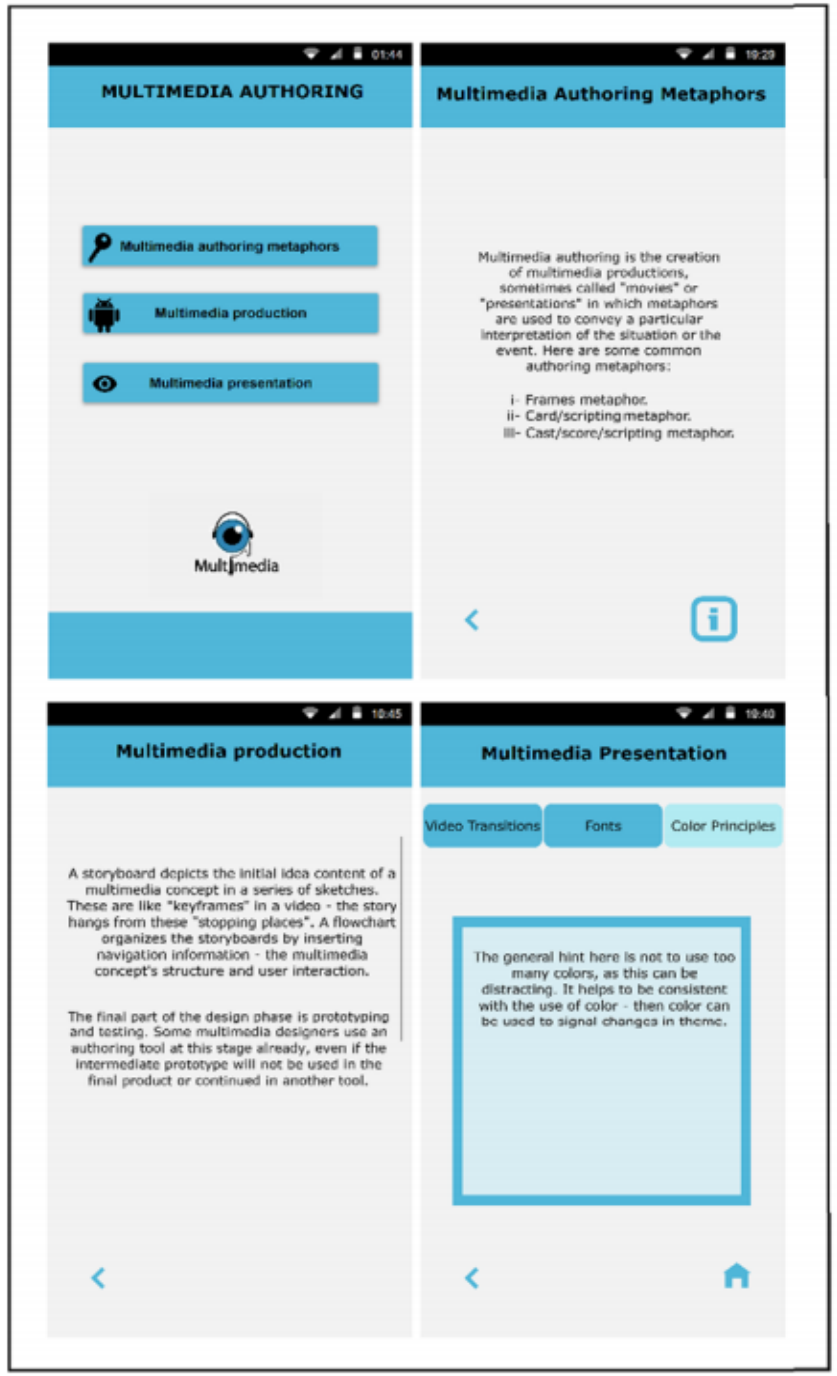


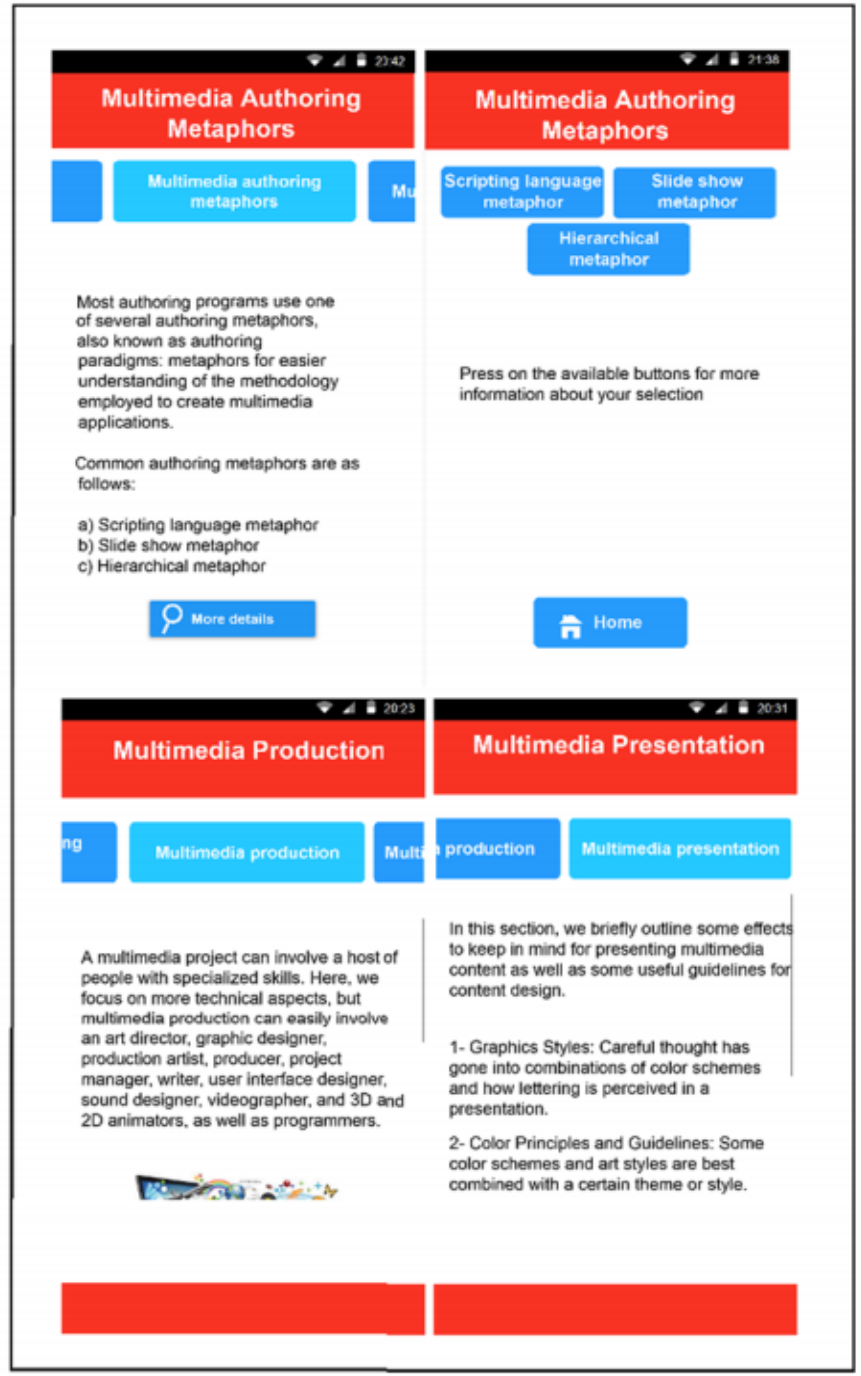
Table 1 Association rules results

No.	Cluster name	Confidence (%)
Neuroticism cluster		
1	Alignment centre ==> Network structure	100
2	Network structure ==> Relative layout	98
3	Low information density ==> Buttons photo	100
4	Verdana header 53-point ==> Segmented control	100
5	Scroll thumb ==> Relative Layout	99
6	Font text size 40-point ==> Relative layout	100
7	Buttons photo ==> Expanding list	100
8	Font header 53-point ==> Verdana font type	96
9	Font text size 40-point = Verdana font type ==> Colour Hue	99
10	Stepping ==> Expanding list	100
Extra-conscientiousness cluster		
1	Slidable top navigation ==> Network structure	100
2	Font size 14 point ==> Relative layout	100
3	High information density ==> Buttons photo	100
4	Slidable top navigation ==> Scroll thumb	97
5	Buttons name and photo ==> Scroll thumb	100
6	Font header 75-point ==> Arial font type	100
7	Font text size 51-point ==> Arial font type	99
8	Scroll thumb ==> Colour hue	100
9	Align text left ==> Font text size 51-point	100
10	Scroll thumb ==> Segmented control	99
11	Relative layout = Font text size 51-point ==> Align text left	100

“Neuroticism” UI



“Extra-conscientiousness” UI



5 Evaluation

Eye-tracking configuration and eye-movement parameters

Pupil diameter

- Cognitive load (Hyona et al., 1995; (Siegle et al., 2008)
- More difficult the task = larger the pupillary dilation (van Der Meer et al., 2010)

Fixation duration

- Attention (Tsai et al., 2012)
- Longer fixation = More time interpreting the component representation in the interface to the internalized representation (Ehmke & Wilson, 2007)

5 Evaluation

Eye-tracking configuration and eye-movement parameters

Eye-tracking glasses

- 30 cm away from device (Samsung Galaxy Note 4)
- Temporal resolution: 30 Hz
- Gaze position accuracy: 0.5 degrees
- Area of Interest : 15.4cm x 7.9cm
  - Covers the display screen
  - Exclude other surrounding environmental elements
- 3-point calibration test before using the UI design

Procedure

1. Explanation of learning task
2. 2 minute free browsing session
3. UI design (2 sessions)
   - Random assignment
   - 10 minute break between each session

6 Results

Between-variance (ANOVA)

- Conducted to examine whether the participants' perceptual experience was similar or different when learning with an interface designed in accordance to their personality types

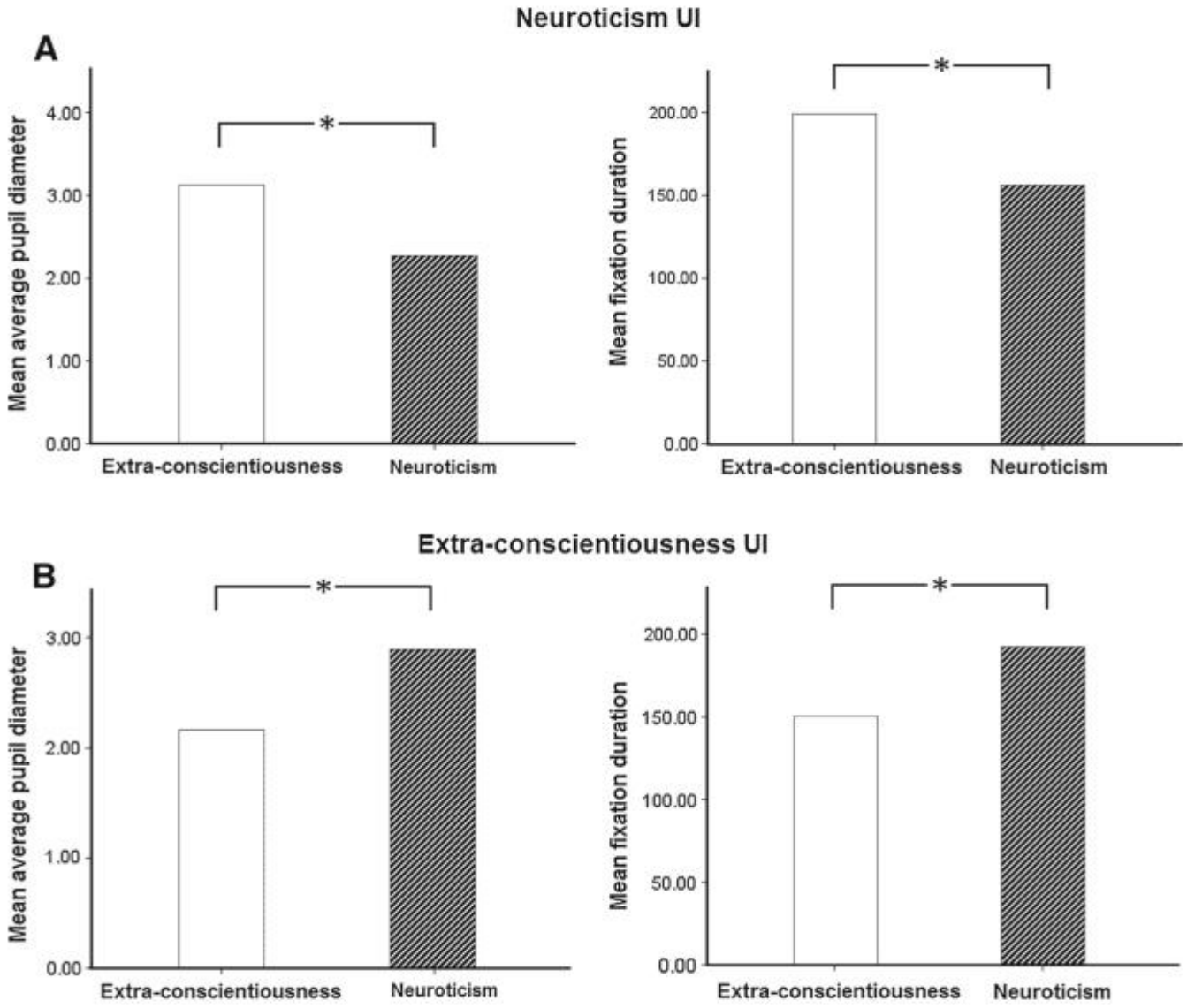
Table 2 Between-variance ANOVA results

Eye events and personality	M	SD	F	Sig.
1. Ave. pupil diameter				
Neuroticism	2.69	1.15	1015.47	0.00
Extra-conscientiousness	2.07	1.36		
2. Fixation duration				
Neuroticism	177.67	148.70	253.84	0.00
Extra-conscientiousness	141.11	146.46		

6 Results

Within-variance (ANOVA)

- Conducted to provide comprehensive insights into how the design preferences of the two personality types affect participants' cognitive load and attention



7 Discussion

- How various characteristics of personality interact with certain design preferences are not yet clear.

- Extraversion
  - attracted to stimulating environments (Swickert et al., 2002)
- Conscientiousness
  - Used to engage in organized and structured activities (Witt et al., 2002)
- Neuroticism
  - Diminished control function (Cremers et al., 2010)

- Results can be interpreted from the human-centered design principle that emphasize the importance of minimizing users' cognitive load
  - Eliminate unnecessary distractions and design elements

8 Implications, Limitations and future works

Implications

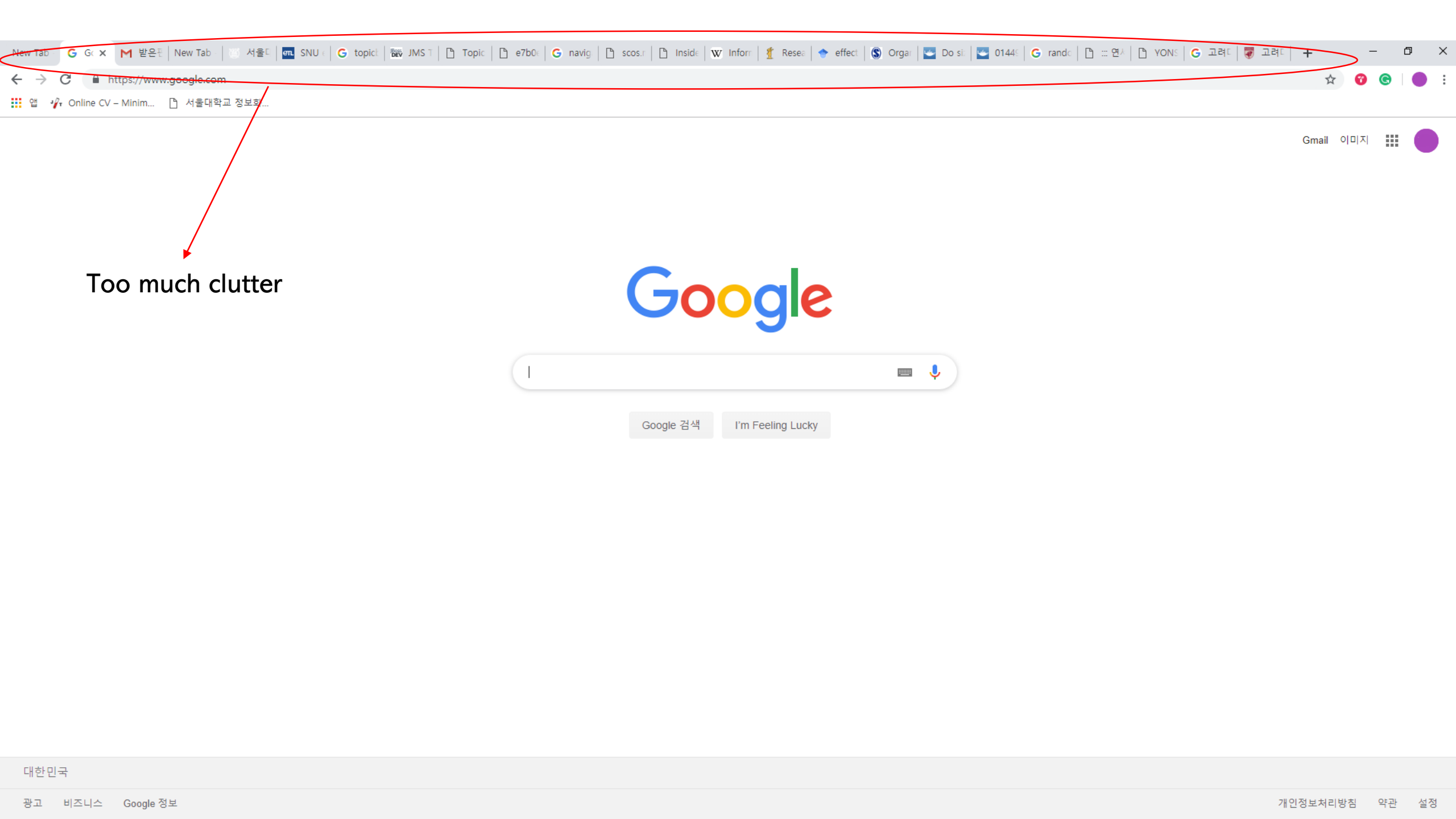
- Advanced interface customization
  - Better information browsing and seeking

Limitations

- Design elements
  - Structure, navigation, layout, font style attributes, font size, button, color, list, information density, support, and alignment
- Mobile learning
- Accuracy for predicting a certain personality profile to a certain UI

Future works

- Non-learning situations
- Gender & Age
- Larger sample size


Too much clutter
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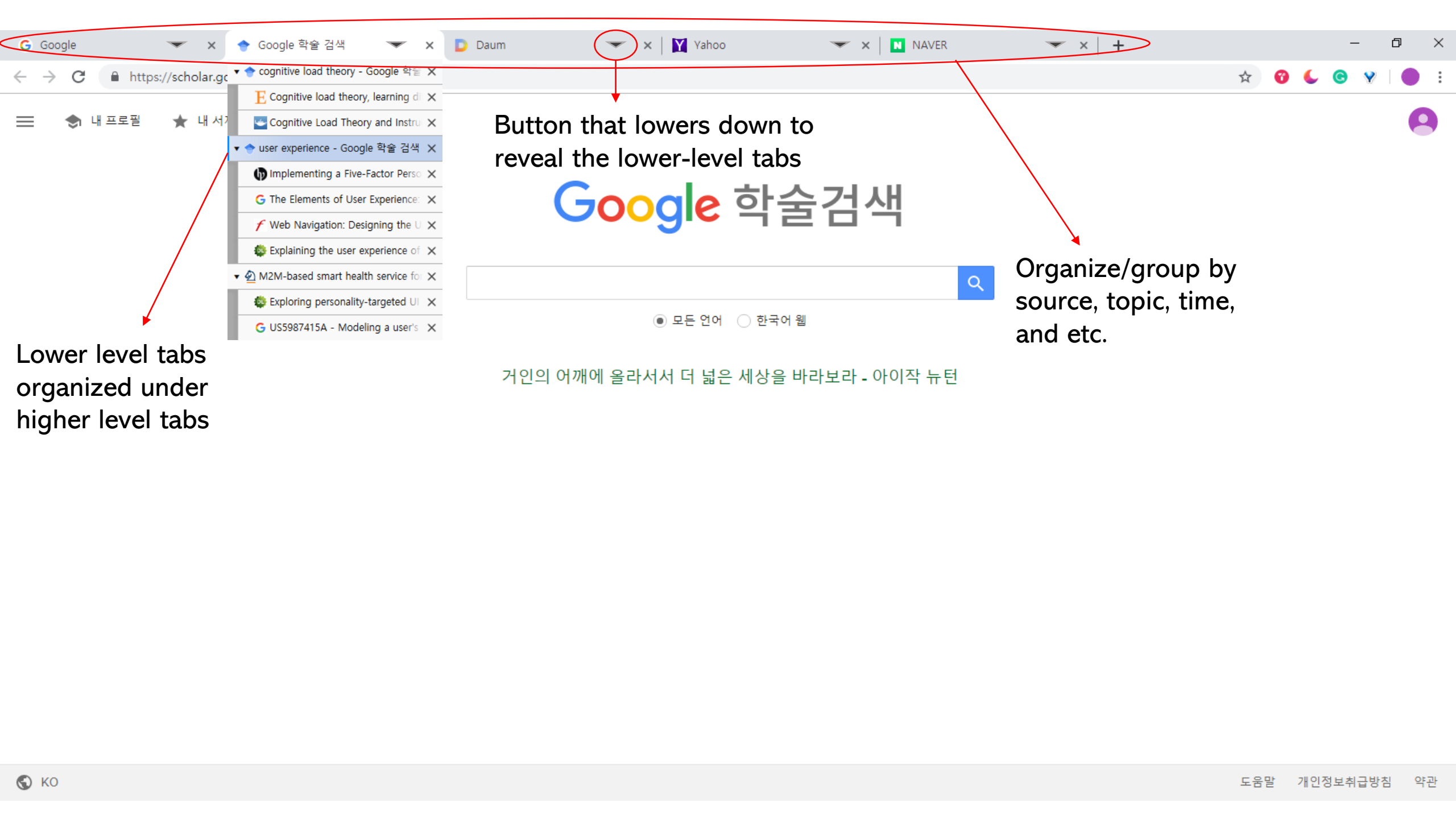
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The Elements of User Experience:
Web Navigation: Designing the U
Explaining the user experience of
M2M-based smart health service fo
Exploring personality-targeted UI
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내 프로필
Button that lowers down to reveal the lower-level tabs
Google 학술검색
모든 언어
한국어 웹
거인의 어깨에 올라서서 더 넓은 세상을 바라보라 - 아이작 뉴턴
Organize/group by source, topic, time, and etc.
Lower level tabs organized under higher level tabs
KO
도움말
개인정보취급방침
약관

THANK YOU

9 References

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