Abstraction against Comprehension

Investigating visual abstraction within interface design and the effect on cognitively challenged users.

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Abstract

This dissertation explores the relationship between user interface design and the conceptual models (CM) required to effectively navigate an interface, specifically for users with neurological disabilities such as Autism, ADHD, Dyslexia, et cetera. Conceptual models are vital to form the basis of user interaction when navigating the digital domain, which can inform users how to interact within an interface, even if they have never used it before.

The project sees the execution of a research study that answers the research question: "**How does visual abstraction affect neurodivergent users' ability to navigate interfaces, and how may this impact their independence?**". The study results either approve or disprove the hypothesis that visual abstraction will make it significantly challenging for a neurotypical user to navigate the interface.

Introduction & Background

The World Health Organisation estimates that one in seven people have some form of disability; that is over 1 billion people worldwide, which is a significant proportion of the population. In comparison to mobile phone usage, in 2018, approximately 95 per cent of households in the United Kingdom owned a mobile phone. An assumption can be made that whilst disability prevalence and smartphone use are high, we can infer that more disabled people will be users of smartphones, and therefore designing for these use cases is of utmost importance to ensure positive user experiences. The features provided by mobile phones can facilitate the development of an individual's life and personality; therefore, it is an essential tool in our society today. Consequently, it is becoming imperative for everyone to have some level of competency with mobile technology to ensure they aren't left behind in society.

Research Methodology

A gap in literature and scientific research was discovered. There were no identified studies investigating specific conceptual models within UIs, such as location, design, photography, and the effect on those with disabilities. There was much research on design guidelines for disabilities, but nothing linked to conceptual models and the impact of the designers' decisions. My research project tackles this gap by producing a project that highlights the significance of the designer's role and how every decision they make is impactful.

An experimental research design was implemented for the study by incorporating quantitative research techniques to inform the study design. Data was obtained by administering a pilot survey to both neurodivergent and neurotypical participants, 11 for each sample group, who were recruited through the completion of a screener survey. The main study recruited an additional 20 neurotypical participants. Quantitative data was generated through the pilot study to assist in interpreting and creating the study variables, including the independent, dependant, moderator, mediator, & control variables.

Research Results

Results of the study have shown no significant correlation between abstraction, age, neurological condition, and how the user was able to navigate an interface. This correlation is very weak; therefore, more work is needed through a larger-scale study. Nonetheless, the results show that the deliberate implementation of abstraction through the study tasks has resulted in the navigation impedance.

Participant	AGS Score	Age
A	70	20
B	140	25
C	160	21
D	200	42
E	230	36
F	240	23
G	200	20
H	120	41
I	170	21
J	140	27
K	210	56
L	270	24
M	200	Data Expired
N	150	38
O	270	24
P	200	30
Q	290	47
R	70	19
S	180	26
T	170	19

Age vs. Time Taken

Age vs. AGS Score

Conclusions

This dissertation was intended to discover the challenges neurodivergent users face when navigating interfaces. Current usability recommendations did not consider the CM's aspect to navigation of UIs; therefore, this project has aimed to bring CM's into the spotlight by highlighting the importance of creating a model which can be understood by those with disabilities and understanding how the experience of an interface could be affected when CM's are not thought for specific users. Finally, a system of identifying issues within a design has been developed—the Abstraction Grading Scale is achieved by scoring participants based on tasks completed incorrectly. Participants scores quickly show how much work an interface needs.
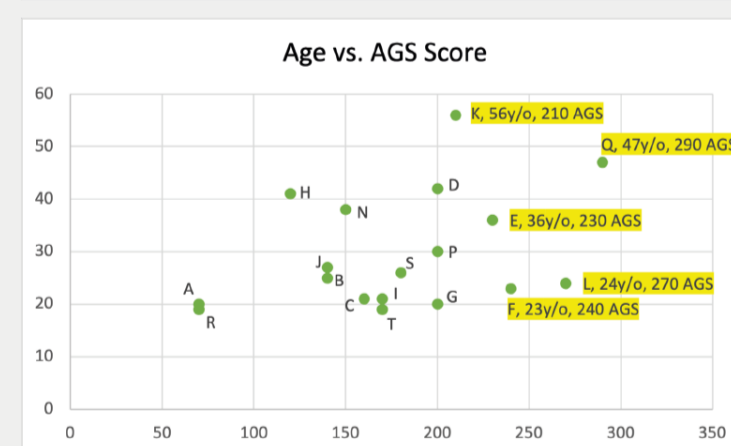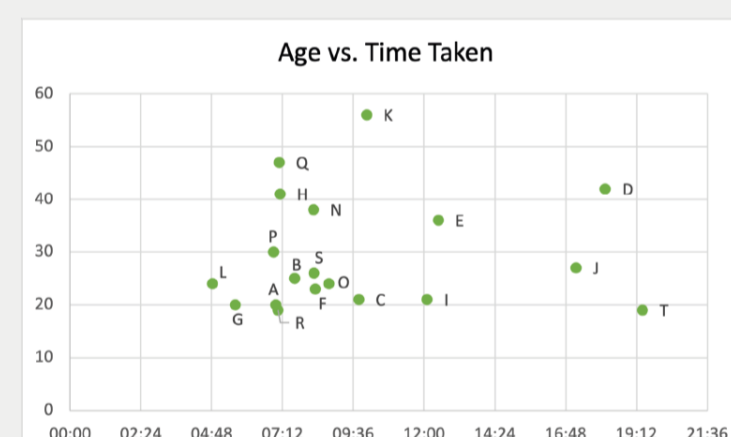
The Study

Level 0: Location
Testing if participants can recall on location conceptual models.

Level 1: Words
Testing users understanding of actionable words on an interface.

Level 2: Traditional
Testing users ability to navigate familiar communication interface.

Level 3: Photos
Investigating users understanding of photos & actions they can take on interface.

Level 4: Design
Can users recall conceptual models when presented with unfamiliar design?