IAT 884 Prototype Proposal

Building a tool to evaluate creativity in product design

Rev 2.0

Date

Student Name

PROBLEM

Computing systems currently used to support creative activities like product development usually feature physically separate input (keyboard and mouse) and output (audio/visual displays). Input devices such as mice and keyboards restrict the majority of user interaction movement to the forearms and fingers, which indirectly affects feedback from the displays. Multi-touch displays allow the direct manipulation of virtual objects through hand position and gesture [3]. While both researchers and marketers have claimed that multi-touch systems offer interaction advantages over traditional hardware, few of these claims have been empirically examined [6].

Recent research in Embodied Cognition [2,4,5] suggests that physical movement beyond what is afforded by keyboards and mice plays an important role in helping us think. Multi-touch displays offer an opportunity to implement gestural interaction with creativity software that could support creativity better than traditional interaction paradigms. The proposed prototype, consisting of custom software coupled with a custom multi-touch table, is intended to be used as the research instrument to investigate how multi-touch interaction to creativity software affects creativity, specifically divergent thinking, in product design or other creative computing activities.

DOMAIN

Officially, the scope of this project is to develop a multi-touch idea-generation support tool system based on theoretically predicted benefits of hands-on interaction. This tool is to be used in an HCI-style observational study which will evaluate the effects of bi-manual multi-touch interaction vs. mouse and keyboard interaction with the tool in a product design task.

WHAT DRIVES THIS DESIGN?

While the design of the prototype will be informed by theoretical concepts from Embodied Cognition theory, it is not a conceptual exploration or a theoretical investigation. Instead it is primarily an interaction exploration concerned with how multi-touch interaction affects creativity in creative tools and/or applications. Even though dealing with creative computing will require a conceptual foundation, this project is all about better understanding and assessing the benefits of using multi-touch interaction in a creative context.

SPECIFIC QUESTION

Does multi-touch interaction enhance divergent thinking in computer-supported product design better than traditional mouse and keyboard?

Previous product design research [1] has shown that external priming and effective analogical transfer positively affect ideation in product design, while recent research in Embodied Cognition [2,4,5] suggests that physical movement influences how we think. Since ideation can be enhanced by cognitive interventions such as analogical priming, the possibility that the cognitive effects of using a bi-manual multi-touch interface will enhance ideation further should be investigated.

NATURE OF PROTOTYPE

AA Note: This section needs more detail to be complete. See the other sample proposal for a good example of the detail required to ensure your prototype is feasible.

To succeed as a research instrument, the prototype must function at both the hardware and software level. On the hardware side, getting a custom-built multi-touch table to work is non-trivial, but achievable. This includes ensuring that the touch tracking is robust across the entire table surface, that multi-touch gestures (such as dragging, pinching, and rotating) are clearly seen by the table cameras, and that the hardware can operate for extended periods of time without crashing.

On the software side, the prototype should function as a somewhat robust creative computing/product design tool. Basic content creation functions and features must be implemented, and the software should ultimately be streamlined for the product design task to be used in the experimental sessions. This includes implementing functions that track participant behavior and allow system output that can be evaluated in terms of divergent thinking and idea generation quality/count.

Because this prototype is intended for use in an experimental setting, aesthetic considerations beyond those that ensure operational stability are of little importance.

VALIDATION APPROACH

This prototype is the key apparatus of empirical research for my thesis, so all considerations of instrument validity and rigor must be framed on that context. If it cannot facilitate participants in carrying out the tasks required by my research design, it is not a valid or rigorous research instrument.

Key features that must be properly implemented in the prototype in order to carry out the research task include:

- A toolset to create and edit 3D and 2D virtual objects, including scaling, rotating, translating, and editing tools. *(AA: Need more detail here)*
- The ability to record participant interaction for analysis, such as timing and order of tool selection
- The ability to store participant design output for post-task evaluation

Special attention must also be paid to the software design part of the prototype in order to avoid UI or interaction issues that may confound participant ideation and divergent thinking. This suggests that a series of pilot studies based on the experimental task will be needed to evaluate the user experience provided by the system and to ensure that the interface imposes an acceptably low cognitive load.

Ultimately, the best we can do to determine if the prototype is a rigorous and valid research instrument is to operationalize divergent thinking and idea generation as clearly as possible and ensure that the prototype supports the measurement of those constructs consistently and reliably.

REFERENCES

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