Writing a Research Paper

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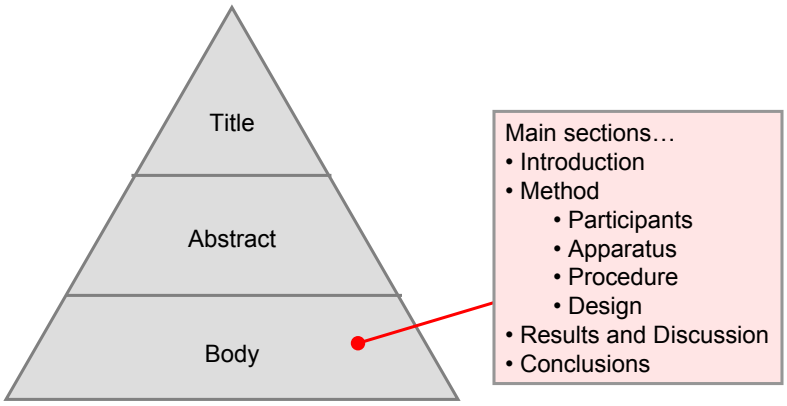
Research Paper

- The final step
- Research is not finished until the results are published!

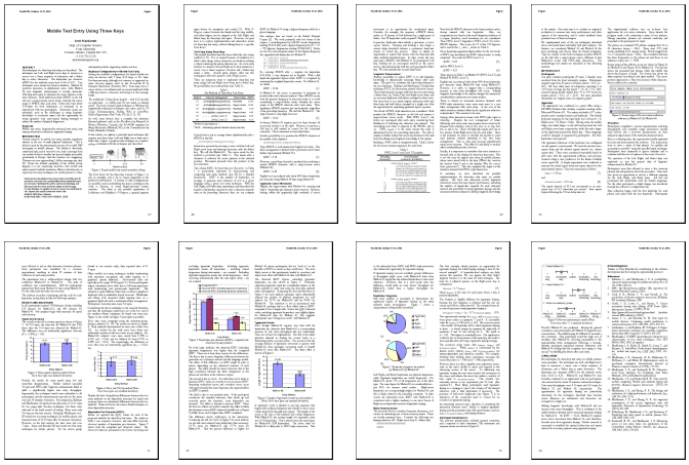
Paper Format

- Journal submissions often accept submissions in any reasonable format, with final formatting to later
- Conferences often include a template file stipulating all formatting and stylistics requirements
  - E.g., CHI publications format

Organization of a Research Paper



Example Publication†



† MacKenzie, I. S. (2002). Mobile text entry using three keys. *Proceedings of the Second Nordic Conference on Human-Computer Interaction – NordiCHI 2002*, 27-34. New York: ACM.

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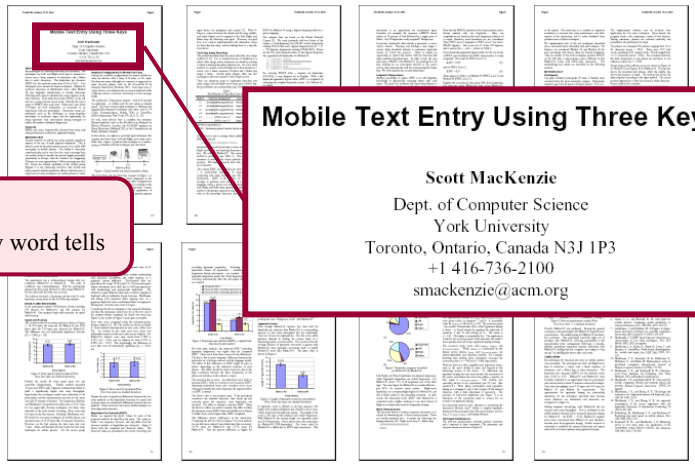
Title, Author(s), Affiliation(s)



Mobile Text Entry Using Three Keys

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Title
• Every word tells

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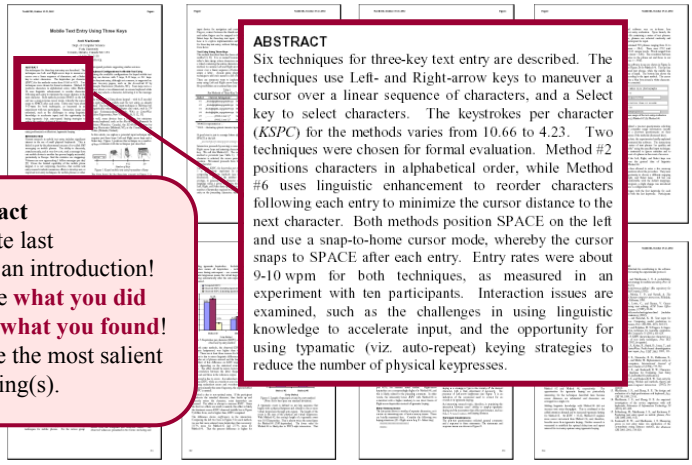
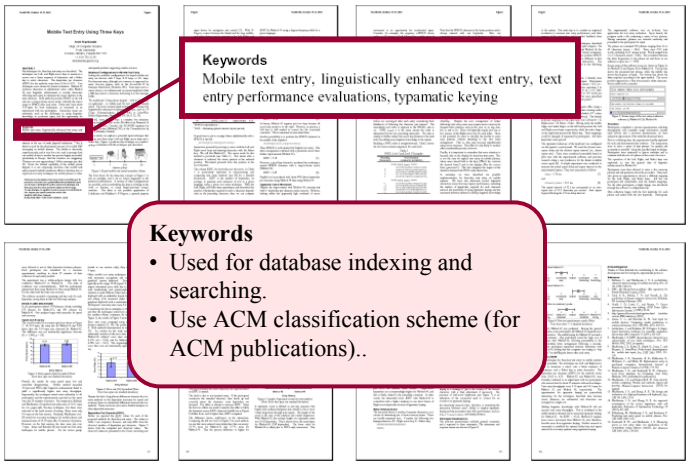
Abstract



ABSTRACT
Six techniques for three-key text entry are described. The techniques use Left- and Right-arrow keys to maneuver a cursor over a linear sequence of characters, and a Select key to select characters. The keystrokes per character (*KSPC*) for the methods varies from 10.66 to 4.23. Two techniques were chosen for formal evaluation. Method #2 positions characters in alphabetical order, while Method #6 uses linguistic enhancement to reorder characters following each entry to minimize the cursor distance to the next character. Both methods position SPACE on the left and use a snap-to-home cursor mode, whereby the cursor snaps to SPACE after each entry. Entry rates were about 9-10 wpm for both techniques, as measured in an experiment with ten participants. Interaction issues are examined, such as the challenges in using linguistic knowledge to accelerate input, and the opportunity for using typamatic (viz. auto-repeat) keying strategies to reduce the number of physical keypresses.

Abstract
- Write last
- Not an introduction!
- State **what you did** and **what you found**!
- Give the most salient finding(s).

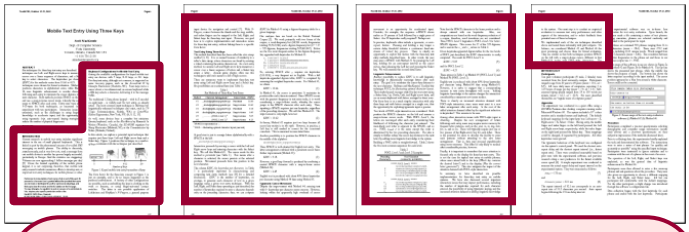
Keywords



Keywords
Mobile text entry, linguistically enhanced text entry, text entry performance evaluations, typamatic keying

Keywords
- Used for database indexing and searching.
- Use ACM classification scheme (for ACM publications)..

Introduction



Introduction

- Give the context for the research, stating why it is interesting and relevant.
- Identify a UI problem or challenge as it currently exists.
- Give an overview of the contents of the entire paper.
- Identify, describe, cite related work.
- Describe and justify your approach to the problem.
- Follow the formatting requirements of conference or journal.
- **It's your story to tell!**

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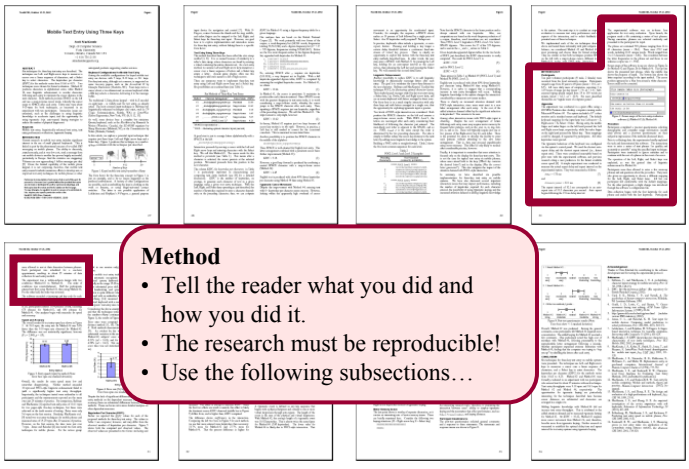
Method



Method

- Tell the reader what you did and how you did it.
- The research must be reproducible!
- Use the following subsections…

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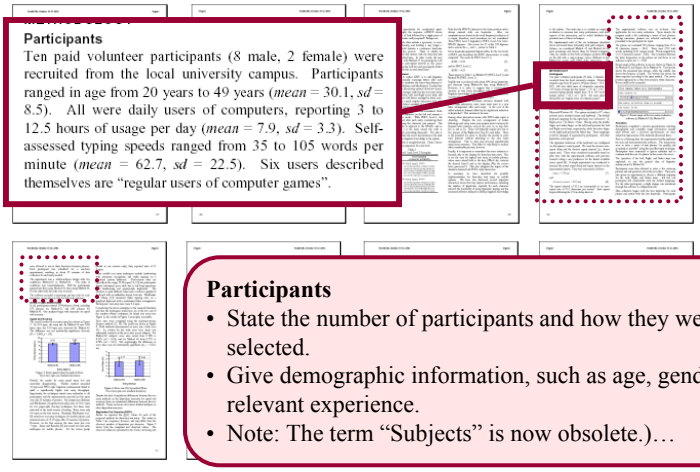
Method - Participants



Participants
Ten paid volunteer participants (8 male, 2 female) were recruited from the local university campus. Participants ranged in age from 20 years to 49 years (*mean* = 30.1, *sd* = 8.5). All were daily users of computers, reporting 3 to 12.5 hours of usage per day (*mean* = 7.9, *sd* = 3.3). Self-assessed typing speeds ranged from 35 to 105 words per minute (*mean* = 62.7, *sd* = 22.5). Six users described themselves are "regular users of computer games".

Participants
- State the number of participants and how they were selected.
- Give demographic information, such as age, gender, relevant experience.
- Note: The term "Subjects" is now obsolete.)…

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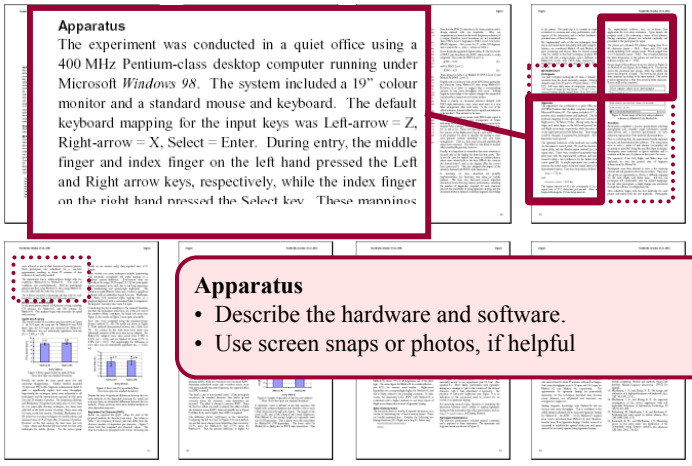
Method - Apparatus



Apparatus
The experiment was conducted in a quiet office using a 400 MHz Pentium-class desktop computer running under Microsoft *Windows 98*. The system included a 19" colour monitor and a standard mouse and keyboard. The default keyboard mapping for the input keys was Left-arrow = Z, Right-arrow = X, Select = Enter. During entry, the middle finger and index finger on the left hand pressed the Left and Right arrow keys, respectively, while the index finger on the right hand pressed the Select key. These mappings

Apparatus
- Describe the hardware and software.
- Use screen snaps or photos, if helpful

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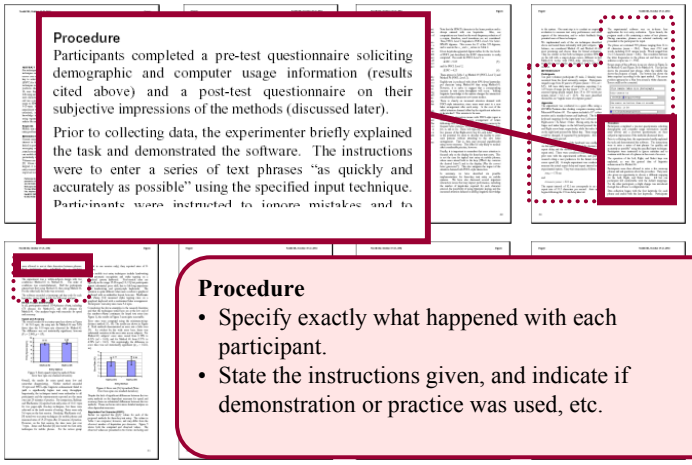
Method - Procedure



Procedure
- Specify exactly what happened with each participant.
- State the instructions given, and indicate if demonstration or practice was used, etc.

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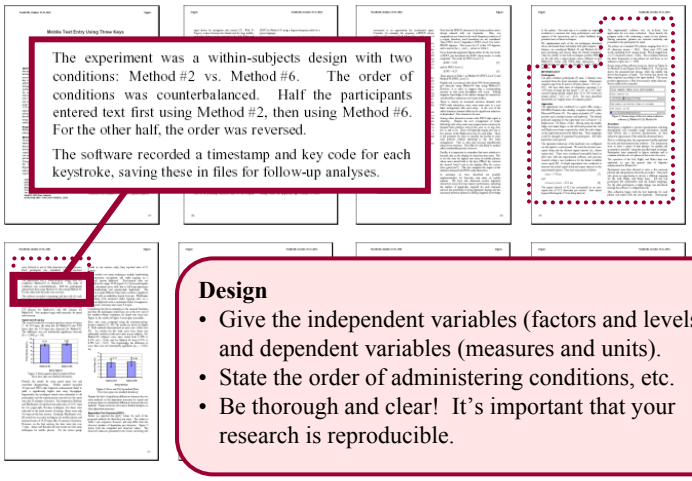
Method - Design



Design
- Give the independent variables (factors and levels) and dependent variables (measures and units).
- State the order of administering conditions, etc.
- Be thorough and clear! It's important that your research is reproducible.

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Results and Discussion

Results and Discussion
- Use subsections as appropriate
- If there were outliers or problems in the data collection, state this up-front.
- Organize results by the dependent measures, moving from overall means to finer details across conditions.
- Use statistical tests, charts, tables, as appropriate

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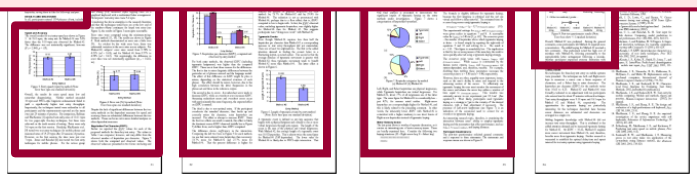
Results and Discussion (2)

- Don't overdo it! Giving too many charts or too much data means you can't distinguish what is important from what is not important.
- Discuss the results. State what is interesting
- Explain the differences across conditions.
- Compare with results from other studies.
- Provide additional analysis, as appropriate, such as fine grain analyses on types of errors or linear regression or correlation analyses for models of interaction (such as Fitts' law).



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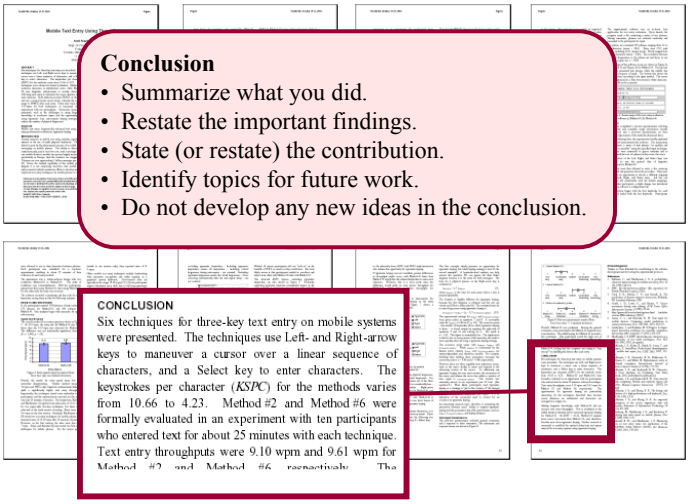
Conclusion

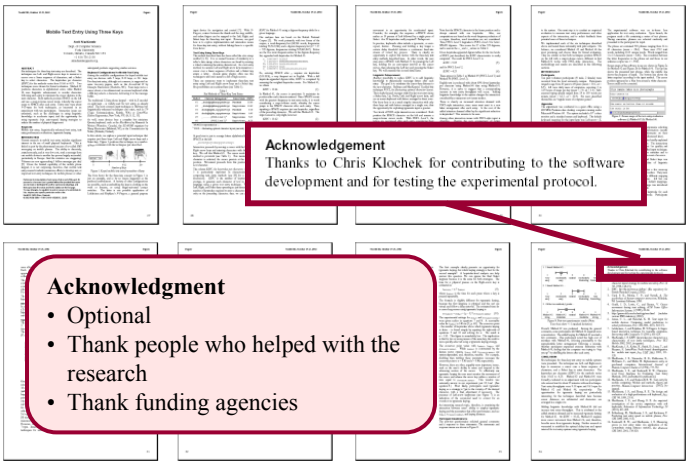


Conclusion
- Summarize what you did.
- Restate the important findings.
- State (or restate) the contribution.
- Identify topics for future work.
- Do not develop any new ideas in the conclusion.

CONCLUSION

Six techniques for three-key text entry on mobile systems were presented. The techniques use Left- and Right-arrow keys to maneuver a cursor over a linear sequence of characters, and a Select key to enter characters. The keystrokes per character (*KSPC*) for the methods varies from 10.66 to 4.23. Method #2 and Method #6 were formally evaluated in an experiment with ten participants who entered text for about 25 minutes with each technique. Text entry throughputs were 9.10 wpm and 9.61 wpm for Method #2 and Method #6 respectively. The

Acknowledgment

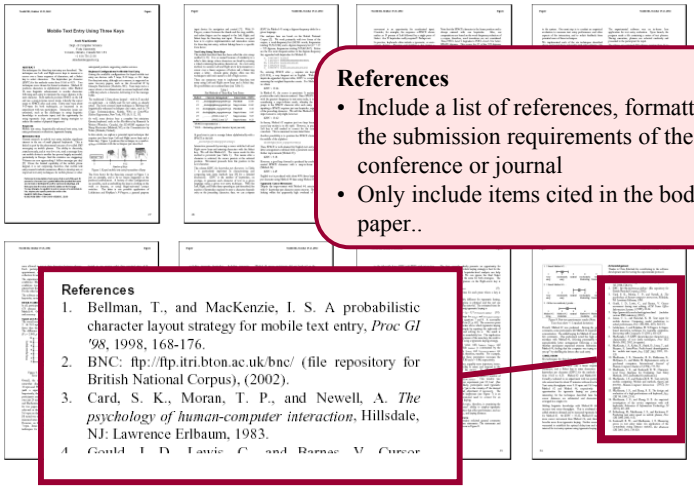


Acknowledgement

Thanks to Chris Klochek for contributing to the software development and for testing the experimental protocol.

Acknowledgment
- Optional
- Thank people who helped with the research
- Thank funding agencies

References



References
- Include a list of references, formatted as per the submission requirements of the conference or journal
- Only include items cited in the body of the paper..

References

1. Bellman, T., and MacKenzie, I. S. A probabilistic character layout strategy for mobile text entry, *Proc GI '98*, 1998, 168-176.
2. BNC: ftp://ftp.itri.bton.ac.uk/bnc/ (file repository for British National Corpus), (2002).
3. Card, S. K., Moran, T. P., and Newell, A. *The psychology of human-computer interaction*, Hillsdale, NJ: Lawrence Erlbaum, 1983.

Writing Style

- Three tips
  1. Be concise
  2. Avoid superfluous words or phrases
  3. Use the active voice, not the passive voice

The Abstract

- The abstract is…
  - the most important section of the research paper
- If the abstract is poorly written, the entire paper is poorly written

Abstract Example #1 – Content

- The abstract should state
  - What you did
  - What you found
- An example from CHI[1]

Next slide

[1] Karat, C. M., Halverson, C., Karat, J., & Horn, D. (1999). Patterns of entry and correction in large vocabulary continuous speech recognition systems, *Proceedings of ACM Conference on Human Factors in Computing Systems -- CHI '99* (pp. 568-575): New York: ACM...

States *what they did*

Abstract

A study was conducted to evaluate user performance and satisfaction in completion of a set of text creation tasks using three commercially available continuous speech recognition systems. The study also compared user performance on similar tasks using keyboard input. One part of the study (Initial Use) involved 24 users who enrolled, received training and carried out practice tasks, and then completed a set of transcription and composition tasks in a single session. In a parallel effort (Extended Use), four researchers used speech recognition to carry out real work tasks over 10 sessions with each of the three speech recognition software products. This paper presents results from the Initial Use phase of the study along with some preliminary results from the Extended Use phase. We present details of the kinds of usability and system design problems likely in current systems and several common patterns of error correction that we found.

Nothing about what they found

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Abstract Example #2 - Content

Improving Keypad Text Entry Methods Using Semantic Relatedness and Part-of-Speech Language Models

While the popularity of handheld mobile devices continues to increase, text entry on such devices is often inefficient and challenging. On devices such as mobile phones that use keypads instead of full keyboards, researchers have found some success in the use of dictionary-based disambiguation methods for text entry. However, problems such as frequently having to deal with ambiguous keystroke sequences, reduced word choices caused by limited dictionary sizes, and large learning curves for novice users can 1) limit the effectiveness of such methods and 2) prevent them from being more widely used with mobile applications and devices. This paper presents a novel dictionary-based disambiguation method which utilizes not only word frequency information but also semantic and syntactical text information to disambiguate keystroke sequences in ambiguous keyboards and more effectively find the user's desired words. The benefits of the method are shown and supported through simulations and an empirical user study.

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Abstract Example #3 – Writing Style

- An example from UIST [1]
- We'll try to revise it to see if there is room for improvement

[1] Lee, J. C., Forlizzi, J., & Hudson, S. E. (2002). The kinetic typography engine: An extensible system for animating expressive text. *Proceedings of the ACM Symposium on User Interface Software and Technology -- UIST 2002*, pp. 81-90. New York: ACM.

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Original

Kinetic typography – text that uses movement or other temporal change – has recently emerged as a new form of communication. As we hope to illustrate in this paper, kinetic typography can be seen as bringing some of the expressive powers of film – such as its ability to convey emotion, portray compelling characters, and visually direct attention – to the strong communicative powers of text. Although kinetic typography offers promise for expressive communication, it has not been widely exploited outside a few limited application areas (most notably in TV advertising). One of the reasons for this has been the lack of tools directly supporting it, and the accompanying difficulty in creating dynamic text. This paper presents a first step in remedying this situation – an extensible robust system for animating text in a wide variety of forms. By supporting an appropriate set of carefully factored abstractions, this engine provides a relatively small set of components that can be plugged together to create a wide range of different expressions. It provides new techniques for animating text used in traditional cartoon animation, and provides specific support for typographical manipulations.

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Revision

Kinetic typography – text that moves or otherwise changes – is a new form of communication. As we illustrate, kinetic typography brings the expressive power of film – the ability to convey emotion, portray compelling characters, and direct attention – to the world of text. Although kinetic typography offers promise, it is not widely exploited outside areas such as TV advertising. Reasons include the lack of support tools and the difficulty in creating dynamic text. Our remedy is an extensible robust system for animating text. Through a set of abstractions, the engine provides a small set of pluggable components to create a range of expressions. It provides new techniques for animating text and provides support for typographical manipulations.

Compare

Kinetic typography – text that uses movement or other temporal cha… w form of communicati… aper, kinetic typogr… of the expressive p… such as its ability to convey emotion, portray compelling characters, and visually direct attention – to the strong communicative powers of text. Alth… com… few … One… dire… crea… rem… anin… app… eng… can … exp… use… sup…

183 words

Kinetic typography – text that moves or otherwise changes – is a new f… ate, kinetic typography … – the ability to convey e… rs, and direct attention – to the world of text. Although kinetic typography offers promise, it is not widely exploited outside areas such as TV advertising. Reasons include the lack of … Our …t. …all …ext

114 words

1. Be concise
Original: *text that uses movement or other temporal change*
Revision: *text that moves or otherwise changes*

2. Avoid superfluous words or phrases
Original: *As we hope to illustrate in this paper…*
Revision: *As we illustrate…*

3. Use the active voice
Original: *it has not been widely exploited…*
Revision: *it is not widely exploited…*

Abstract Deconstructed (1)

Kinetic typography – text that uses movement or other temporal change – has recently emerged as a new form of communication.	1	Kinetic typography – text that moves or otherwise changes – is a new form of communication.
As we hope to illustrate in this paper, kinetic typography can be seen as bringing some of the expressive powers of film – such as its ability to convey emotion, portray compelling characters, and visually direct attention – to the strong communicative powers of text.	2	As we illustrate, kinetic typography brings the expressive power of film – the ability to convey emotion, portray compelling characters, and direct attention – to the world of text.

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Abstract Deconstructed (2)

Although kinetic typography offers promise for expressive communication, it has not been widely exploited outside a few limited application areas (most notably in TV advertising).	3	Although kinetic typography offers promise, it is not widely exploited outside areas such as TV advertising
One of the reasons for this has been the lack of tools directly supporting it, and the accompanying difficulty in creating dynamic text.	4	Reasons include the lack of support tools and the difficulty in creating dynamic text.

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Abstract Deconstructed (3)

This paper presents a first step in remedying this situation – an extensible robust system for animating text in a wide variety of forms.	5	Our remedy is an extensible robust system for animating text.
By supporting an appropriate set of carefully factored abstractions, this engine provides a relatively small set of components that can be plugged together to create a wide range of different expressions.	6	Through a set of abstractions, the engine provides a small set of pluggable components to create a range of expressions.

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Abstract Deconstructed (4)

It provides new techniques for animating text used in traditional cartoon animation, and provides specific support for typographical manipulations.	7	It provides new techniques for animating text and provides support for typographical manipulations.

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Example #4 [1]

The recognition ambiguity of a recognition-based user interface is inevitable. Multimodal architecture should be an effective means to reduce the ambiguity, and contribute to error avoidance and recovery, compared with a unimodal one. But does the multimodal architecture always perform better than the unimode at any time? If not, when does it perform better than unimode, and when is it the optimum? Furthermore, how can modalities best be combined to gain the advantage of synergy? Little is known about these issues in the literature available. In this paper we try to give the answer through analyzing integration strategies for gaze and speech modalities, together with an evaluation experiment verifying these analyses. The approach involves studying the mutual correction cases and investigating when the mutual correction phenomena will occur. The goal of this study is to gain insights into integration strategies, and develop an optimum system to make error-prone recognition technologies perform at a more stable and robust level within a multimodal architecture.

[1] Zhang, Q., Imamiya, A., Go, K., & Mao, X. (2004). Resolving ambiguities of a gaze and speech interface *Proceedings of the 2004 Symposium on Eye Tracking Research & Applications – ETRA 2004* (pp. 85-92). San Antonio, Texas: ACM Press.

Tip #4

- "Get the little book"[1]

1. Strunk, Jr., W., and White, E. B. (2000). *The elements of style* (4th ed.). London: Allyn and Bacon..

Thank you

Questions?