Making the mainstream accessible: what’s in a game?

This item was submitted to Loughborough University’s Institutional Repository by the/an author.


Additional Information:

- This conference paper was presented at ICCHP 2006 (www.icchp.org/2006/) and subsequently published in the series, Lecture Notes in Computer Science [© Springer-Verlag Berlin Heidelberg] at: http://dx.doi.org/10.1007/11788713

Metadata Record: https://dspace.lboro.ac.uk/2134/4461

Version: Accepted for publication

Publisher: © Springer-Verlag Berlin Heidelberg

Please cite the published version.
This item was submitted to Loughborough’s Institutional Repository (https://dspace.lboro.ac.uk/) by the author and is made available under the following Creative Commons Licence conditions.

For the full text of this licence, please go to: http://creativecommons.org/licenses/by-nc-nd/2.5/
Making the Mainstream Accessible
What's in a Game?

Matthew Tylee Atkinson
<M.T.Atkinson@lboro.ac.uk>
http://www.agrip.org.uk/

Research School of Informatics
Department of Computer Science
Loughborough University

13th July 2006
The Past of Accessible Gaming

This talk concentrates on sight loss but could be applied to other disabilities.

Many individuals and some small companies started developing accessible games for disabled people.

Suddenly blind people were no longer limited to one genre (Interactive Fiction).

Most of the games were conversions of puzzles or classic arcade games.

Some developers have been more original.

Drawback: Segregation.
This talk concentrates on sight loss but could be applied to other disabilities.
This talk concentrates on sight loss but could be applied to other disabilities.

Many individuals and some small companies started developing accessible games for disabled people.
This talk concentrates on sight loss but could be applied to other disabilities.

Many individuals and some small companies started developing accessible games for disabled people.

Suddenly blind people were no longer limited to one genre (Interactive Fiction).
This talk concentrates on sight loss but could be applied to other disabilities

Many individuals and some small companies started developing accessible games for disabled people

Suddenly blind people were no longer limited to one genre (Interactive Fiction)

Most of the games were conversions of puzzles or classic arcade games
This talk concentrates on sight loss but could be applied to other disabilities

Many individuals and some small companies started developing accessible games for disabled people

Suddenly blind people were no longer limited to one genre (Interactive Fiction)

Most of the games were conversions of puzzles or classic arcade games

Some developers have been more original
This talk concentrates on sight loss but could be applied to other disabilities.

Many individuals and some small companies started developing accessible games for disabled people.

Suddenly blind people were no longer limited to one genre (Interactive Fiction).

Most of the games were conversions of puzzles or classic arcade games.

Some developers have been more original.

**Drawback:** Segregation.
The Present of Accessible Gaming

Ethos of the AGRIP Project

▶ Provide access to not only mainstream games, but their surrounding online community and development tools
▶ Give people Freedom to use and modify the game, support infrastructure and tools

AudioQuake
▶ An “Accessibility Layer” for Quake (id Software)
▶ A system for playing Internet multiplayer games
▶ A platform for programming modifications
▶ Only possible due to Open Source nature
▶ Provides and promotes inclusion

AGDev and other developments
The Present of Accessible Gaming

Ethos of the AGRIP Project

▶ Provide access to not only mainstream games, but their surrounding online community and development tools
▶ Give people Freedom to use and modify the game, support infrastructure and tools
▶ AudioQuake
  ▶ An “Accessibility Layer” for Quake (id Software)
  ▶ A system for playing Internet multiplayer games
  ▶ A platform for programming modifications
  ▶ Only possible due to Open Source nature
▶ Provides and promotes inclusion
▶ AGDev and other developments

Context
The Present of Accessible Gaming

Ethos of the AGRIP Project

▶ Provide access to not only mainstream games, but their surrounding online community and development tools

AudioQuake

▶ An “Accessibility Layer” for Quake (id Software)
▶ A system for playing Internet multiplayer games
▶ A platform for programming modifications
▶ Only possible due to Open Source nature

▶ Provides and promotes inclusion

AGDev and other developments
The Present of Accessible Gaming

Ethos of the AGRIP Project

- Provide access to not only mainstream games, but their surrounding online community and development tools
- Give people Freedom to use and modify the game, support infrastructure and tools
The Present of Accessible Gaming

Ethos of the AGRIP Project

- Provide access to not only mainstream games, but their surrounding online community and development tools
- Give people Freedom to use and modify the game, support infrastructure and tools

- AudioQuake

Context - Now
The Present of Accessible Gaming

Ethos of the AGRIP Project

- Provide access to not only mainstream games, but their surrounding online community and development tools
- Give people Freedom to use and modify the game, support infrastructure and tools

- AudioQuake
  - An “Accessibility Layer” for Quake (id Software)
The Present of Accessible Gaming

Ethos of the AGRIP Project

- Provide access to not only mainstream games, but their surrounding online community and development tools
- Give people Freedom to use and modify the game, support infrastructure and tools

AudioQuake
- An “Accessibility Layer” for Quake (id Software)
- A system for playing Internet multiplayer games
The Present of Accessible Gaming

Ethos of the AGRIP Project

- Provide access to not only mainstream games, but their surrounding online community and development tools
- Give people Freedom to use and modify the game, support infrastructure and tools

AudioQuake

- An “Accessibility Layer” for Quake (id Software)
- A system for playing Internet multiplayer games
- A platform for programming modifications
The Present of Accessible Gaming

Ethos of the AGRIP Project

- Provide access to not only mainstream games, but their surrounding online community and development tools
- Give people Freedom to use and modify the game, support infrastructure and tools

AudioQuake
- An “Accessibility Layer” for Quake (id Software)
- A system for playing Internet multiplayer games
- A platform for programming modifications
- Only possible due to Open Source nature
Ethos of the AGRIP Project

- Provide access to not only mainstream games, but their surrounding online community and development tools
- Give people Freedom to use and modify the game, support infrastructure and tools

AudioQuake
- An “Accessibility Layer” for Quake (id Software)
- A system for playing Internet multiplayer games
- A platform for programming modifications
- Only possible due to Open Source nature
- Provides and promotes inclusion
The Present of Accessible Gaming

Ethos of the AGRIP Project

▶ Provide access to not only mainstream games, but their surrounding online community and development tools
▶ Give people Freedom to use and modify the game, support infrastructure and tools

▶ AudioQuake
  ▶ An “Accessibility Layer” for Quake (id Software)
  ▶ A system for playing Internet multiplayer games
  ▶ A platform for programming modifications
  ▶ Only possible due to Open Source nature
  ▶ Provides and promotes inclusion

▶ AGDev and other developments
The Future of Accessible Gaming

- AGRIP Developments
The Future of Accessible Gaming

- AGRIP Developments
  - “Implicit Accessibility”
The Future of Accessible Gaming

▶ AGRIP Developments
  ▶ “Implicit Accessibility”
  ▶ Level design
AGRIP Developments

- “Implicit Accessibility”
- Level design

Audiogames and Accessible games gain weight in industry
The Future of Accessible Gaming

- AGRIP Developments
  - “Implicit Accessibility”
  - Level design
- Audiogames and Accessible games gain weight in industry
  - **Definition**: “accessible games” vs. “audiogames”
The Future of Accessible Gaming

- AGRIP Developments
  - “Implicit Accessibility”
  - Level design

- Audiogames and Accessible games gain weight in industry
  - **Definition:** “accessible games” vs. “audiogames”
  - John Carmack’s Keynote point
AGRIP Developments
  ▶ “Implicit Accessibility”
  ▶ Level design

Audiogames and Accessible games gain weight in industry
  ▶ Definition: “accessible games” vs. “audiogames”
  ▶ John Carmack’s Keynote point
  ▶ Potential mobile market
The Future of Accessible Gaming

- AGRIP Developments
  - “Implicit Accessibility”
  - Level design

- Audiogames and Accessible games gain weight in industry
  - **Definition:** “accessible games” vs. “audiogames”
  - John Carmack’s Keynote point
  - Potential mobile market
  - Work of IGDA, AudioGames.net, AGDev and others
The Future of Accessible Gaming

- AGRIP Developments
  - “Implicit Accessibility”
  - Level design
- Audiogames and Accessible games gain weight in industry
  - Definition: “accessible games” vs. “audiogames”
  - John Carmack’s Keynote point
  - Potential mobile market
  - Work of IGDA, AudioGames.net, AGDev and others
- Education and Games get together
The Future of Accessible Gaming

- AGRIP Developments
  - “Implicit Accessibility”
  - Level design

- Audiogames and Accessible games gain weight in industry
  - **Definition:** “accessible games” vs. “audiogames”
  - John Carmack’s Keynote point
  - Potential mobile market
  - Work of IGDA, AudioGames.net, AGDev and others

- Education and Games get together
  - EA and NESTA study on games in education [NESTA and EA, 2005]
The Future of Accessible Gaming

- AGRIP Developments
  - “Implicit Accessibility”
  - Level design

- Audiogames and Accessible games gain weight in industry
  - **Definition**: “accessible games” vs. “audiogames”
  - John Carmack’s Keynote point
  - Potential mobile market
  - Work of IGDA, AudioGames.net, AGDev and others

- Education and Games get together
  - EA and NESTA study on games in education [NESTA and EA, 2005]
  - Potential to augment existing practises and assist in teaching
Lowest level
Local Navigation

- Lowest level
  - Contrast to global navigation
Local Navigation

- Lowest level
  - Contrast to global navigation
- Technique: “Devices” [GMA Games, 2001]
Overview
Structure Adaption and Filtering

- Overview
- Domain-Specific Solutions
Structure Adaption and Filtering

- Overview
- Domain-Specific Solutions
- Case-Study: The ESR
Structure Adaption and Filtering

- Overview
- Domain-Specific Solutions
- Case-Study: The ESR
- Generalisation
Accessibility by “Piggy-backing”
Overview

- Accessibility by “Piggy-backing”
  - Model used by a lot of AT (Screenreaders, PDF, ...)

Much effort required to interpret layout [Hanson and Richards, 2004, Pontelli et al., 2000]

Information gap

Obsolescence

Need for decoupled rendering
Overview

- Accessibility by “Piggy-backing”
  - Model used by a lot of AT (Screenreaders, PDF, …)
  - Much effort required to interpret layout [Hanson and Richards, 2004, Pontelli et al., 2000]
Accessibility by “Piggy-backing”
- Model used by a lot of AT (Screenreaders, PDF, ...)
- Much effort required to interpret layout [Hanson and Richards, 2004, Pontelli et al., 2000]
- Information gap
Accessibility by “Piggy-backing”
- Model used by a lot of AT (Screenreaders, PDF, ...)
- Much effort required to interpret layout [Hanson and Richards, 2004, Pontelli et al., 2000]
- Information gap
- Obsolescence
Overview

- Accessibility by “Piggy-backing”
  - Model used by a lot of AT (Screenreaders, PDF, ...)
  - Much effort required to interpret layout [Hanson and Richards, 2004, Pontelli et al., 2000]
  - Information gap
  - Obsolescence

- Need for decoupled rendering
Domains-Specific Solutions

Necessity-based rendering
- Avoids information overload
- User-centred flexibility
- Even within disability groups, needs and preferences may vary significantly
- Appropriate adaptation of existing information [Brewster and Brown, 2004, Smith et al., 2004]
- Little/no need to invent extra information in many cases
Necessity-based rendering
Necessity-based rendering
  - Avoids information overload
Domain-Specific Solutions

- Necessity-based rendering
  - Avoids information overload
- User-centred flexibility

Even within disability groups, needs and preferences may vary significantly. Appropriate adaptation of existing information [Brewster and Brown, 2004, Smith et al., 2004] may be needed in many cases.
Domain-Specific Solutions

- Necessity-based rendering
  - Avoids information overload
- User-centred flexibility
  - Even within disability groups, needs and preferences may vary significantly

Appropriate adaptation of existing information [Brewster and Brown, 2004, Smith et al., 2004]

Little/no need to invent extra information in many cases
Domain-Specific Solutions

- Necessity-based rendering
  - Avoids information overload
- User-centred flexibility
  - Even within disability groups, needs and preferences may vary significantly
- Appropriate adaptation of existing information [Brewster and Brown, 2004, Smith et al., 2004]
Domain-Specific Solutions

- Necessity-based rendering
  - Avoids information overload
- User-centred flexibility
  - Even within disability groups, needs and preferences may vary significantly
- Appropriate adaptation of existing information [Brewster and Brown, 2004, Smith et al., 2004]
  - Little/no need to invent extra information in many cases
Case Study: The ESR

Detects other creatures in the game (enemies, monsters, teammates)

Sound scheme

Perceived need for "fairness"

Give blind players positional information for enemies

In reality... confusion and information overload [Brewster, 1997]

Local and global navigation don't mix

"fair advantage" not necessary?
EtherScan RADAR

Detects other creatures in the game (enemies, monsters, teammates)

Perceived need for "fairness"

Give blind players positional information for enemies

In reality... confusion and information overload [Brewster, 1997]

Local and global navigation don't mix

"fair advantage" not necessary?
EtherScan RADAR
  - Detects other creatures in the game (enemies, monsters, teammates)
Case Study: The ESR

EtherScan RADAR

- Detects other creatures in the game (enemies, monsters, teammates)
- Sound scheme
EtherScan RADAR
- Detects other creatures in the game (enemies, monsters, teammates)
- Sound scheme
- Perceived need for “fairness”
EtherScan RADAR

- Detects other creatures in the game (enemies, monsters, teammates)
- Sound scheme

Perceived need for “fairness”

- Give blind players positional information for enemies
EtherScan RADAR
- Detects other creatures in the game (enemies, monsters, teammates)
- Sound scheme

Perceived need for “fairness”
- Give blind players positional information for enemies
- In reality... confusion and information overload [Brewster, 1997]
EtherScan RADAR
- Detects other creatures in the game (enemies, monsters, teammates)
- Sound scheme

Perceived need for “fairness”
- Give blind players positional information for enemies
- In reality... confusion and information overload [Brewster, 1997]
- Local and global navigation don’t mix
Case Study: The ESR

- EtherScan RADAR
  - Detects other creatures in the game (enemies, monsters, teammates)
  - Sound scheme

- Perceived need for “fairness”
  - Give blind players positional information for enemies
  - In reality... confusion and information overload [Brewster, 1997]
  - Local and global navigation don’t mix
  - “fair advantage” not necessary?
Which information can be left out?

Which is required?

A model is needed

Application of these techniques in other areas
Which information can be left out?
Generalisation

- Which information can be left out?
- Which is required?
Generalisation

- Which information can be left out?
- Which is required?
- A model is needed
Which information can be left out?
Which is required?
A model is needed
Application of these techniques in other areas
Serialisation and Prioritisation

- Overview
Serialisation and Prioritisation

- Overview
- Domain-Specific Features and Solutions
Universal route to making a medium accessible (e.g. [LAMBDA Project, 2005])
Universal route to making a medium accessible (e.g. [LAMBDA Project, 2005])

...though not necessarily usable (e.g. screenreader serialisation of tables)
Imagine a series of channels, each having certain bandwidth. Information streamed to user over a particular channel. Channels correspond to output devices directly, or many-to-one. AudioQuake and other accessible games ([GMA Games, 2001, ESP Softworks, 2001]) often use many-to-one. Principles developed:

- Periodic rendering by priority
- Sub-domain prioritisation
- Multimodality across domains
- Cross-domain prioritisation

Serialisation and Prioritisation
Imagine a series of **channels**, each having certain **bandwidth**.
Imagine a series of **channels**, each having certain **bandwidth**. Information **streamed** to user over a particular channel.
Imagine a series of **channels**, each having certain **bandwidth**

Information **streamed** to user over a particular channel

Channels correspond to **output devices** directly, or many-to-one
Imagine a series of channels, each having certain bandwidth.

Information streamed to user over a particular channel.

Channels correspond to output devices directly, or many-to-one:

- AudioQuake and other accessible games ([GMA Games, 2001, ESP Softworks, 2001]) often use many-to-one.
Imagine a series of **channels**, each having certain **bandwidth**

Information **streamed** to user over a particular channel

Channels correspond to **output devices** directly, or many-to-one

  - AudioQuake and other accessible games ([GMA Games, 2001, ESP Softworks, 2001]) often use many-to-one

- Principles developed
Imagine a series of **channels**, each having certain **bandwidth**

Information **streamed** to user over a particular channel

Channels correspond to **output devices** directly, or many-to-one

- AudioQuake and other accessible games ([GMA Games, 2001, ESP Softworks, 2001]) often use many-to-one

Principles developed

- Periodic rendering by priority
Imagine a series of **channels**, each having certain **bandwidth**.

Information **streamed** to user over a particular channel.

Channels correspond to **output devices** directly, or many-to-one.

- AudioQuake and other accessible games ([GMA Games, 2001, ESP Softworks, 2001]) often use many-to-one.

**Principles developed**:
- Periodic rendering by priority
- Sub-domain prioritisation
Imagine a series of channels, each having certain bandwidth. Information streamed to user over a particular channel. Channels correspond to output devices directly, or many-to-one. AudioQuake and other accessible games (GMA Games, 2001, ESP Softworks, 2001) often use many-to-one. Principles developed: Periodic rendering by priority, Sub-domain prioritisation, Multimodality across domains.
Imagine a series of **channels**, each having certain **bandwidth**

Information **streamed** to user over a particular channel

Channels correspond to **output devices** directly, or many-to-one

- AudioQuake and other accessible games ([GMA Games, 2001, ESP Softworks, 2001]) often use many-to-one

**Principles developed**

- Periodic rendering by priority
- Sub-domain prioritisation
- Multimodality across domains
- Cross-domain prioritisation
Growing interest [NESTA and EA, 2005, Gee, 2003]

AudioQuake used to "test the water" [ICC Committee, ]

Areas for future work

Application to other 3D engines and applications

Collaboration

Use in other forms of navigation

Direct use in educational settings (e.g. [Laird, 2001], or as a replacement for accessible programming systems [Sánchez and Aguayo, 2005])
Growing interest [NESTA and EA, 2005, Gee, 2003]
Growing interest [NESTA and EA, 2005, Gee, 2003]
AudioQuake used to “test the water” [ICC Committee, ]
Growing interest [NESTA and EA, 2005, Gee, 2003]

AudioQuake used to “test the water” [ICC Committee, ]

Areas for future work
Growing interest [NESTA and EA, 2005, Gee, 2003]
AudioQuake used to “test the water” [ICC Committee, ]
Areas for future work
  Application to other 3D engines and applications
Growing interest [NESTA and EA, 2005, Gee, 2003]
AudioQuake used to “test the water” [ICC Committee, ]
Areas for future work
  ▶ Application to other 3D engines and applications
  ▶ Collaboration
Growing interest [NESTA and EA, 2005, Gee, 2003]

AudioQuake used to “test the water” [ICC Committee, ]

Areas for future work
  - Application to other 3D engines and applications
  - Collaboration
  - Use in other forms of navigation
Growing interest [NESTA and EA, 2005, Gee, 2003]
AudioQuake used to “test the water” [ICC Committee, ]
Areas for future work
  - Application to other 3D engines and applications
  - Collaboration
  - Use in other forms of navigation
  - Direct use in educational settings (e.g. [Laird, 2001], or as a replacement for accessible programming systems [Sánchez and Aguayo, 2005])
Final Thoughts

- User Survey
Final Thoughts

- User Survey
- Further Work
Final Thoughts

- User Survey
- Further Work
- Conclusions
This survey covered 20 users of AudioQuake.
Further Work

1. Improve existing techniques
2. Generalisation & relation to other current research
3. Accessible map editing

Final Thoughts
Further Work

- Improve existing techniques
Further Work

- Improve existing techniques
- Generalisation & relation to other current research
Further Work

- Improve existing techniques
- Generalisation & relation to other current research
- Accessible map editing
Conclusions

- What accessible (and audio) games are
What accessible (and audio) games are
How low-level issues may be tackled
Conclusions

▶ What accessible (and audio) games are
▶ How low-level issues may be tackled
  ▶ Local navigation
Conclusions

- What accessible (and audio) games are
- How low-level issues may be tackled
  - Local navigation
  - Workarounds for information overload
Conclusions

- What accessible (and audio) games are
- How low-level issues may be tackled
  - Local navigation
  - Workarounds for information overload
- Brief overview of non-game aspects
Conclusions

- What accessible (and audio) games are
- How low-level issues may be tackled
  - Local navigation
  - Workarounds for information overload
- Brief overview of non-game aspects
- Tried and proposed educational uses
Acknowledgements

Acknowledgements

Final Thoughts
Acknowledgements

- id Software
Acknowledgements

- id Software
- The Quake & QuakeWorld community
Acknowledgements

- id Software
- The Quake & QuakeWorld community
- The AGRIP community
Acknowledgements

- id Software
- The Quake & QuakeWorld community
- The AGRIP community
- The Grundy Educational Trust
Thanks for listening!
Any Questions?


ICC Committee.  
International camp on computers and communications.  
http://www.icc-camp.info/.  

Using a computer game to develop advanced ai.  
*Computer*, 34:70–75.  

LAMBDA Project (2005).  
Linear Access to Mathematic for Braille Device and Audio-synthesis.  
http://www.lambdaproject.org/.  

NESTA and EA (2005).  
Futurelab.  